



Professor John Griffith: vice-chancellor's salary is "grossly excessive".

Lord Annan's salary attacked

by Judith Judd
The salary of £26,000 to be paid to the new vice-chancellor of London University, Lord Annan, is a misuse of public funds, a university professor has said in a letter to the Comptroller and Auditor General.
Professor John Griffith, the university's professor of public law, has sent a copy of a senate resolution recommending the payment of a salary of £23,000 plus a London allowance. He says that the total salary will be around £26,000 taking into account the award just made to university teachers.
Lord Annan will be the university's first full-time vice-chancellor.
Professor Griffith says: "You will be aware that until very recently the vice-chancellor received no payment but continued to draw his salary as professor or head of school."
"You will also be aware that the vice-chancellorship is not an office comparable with the vice-chancellorship of a non-federal university."
The letter points to the powers of the university's schools in teaching, research and administration. It compares London's vice-chancellorship with those of Oxford and Cambridge.
"The vice-chancellor of the University of London makes virtually none of the important decisions relating to teaching and to research. His administrative functions are either formal and ritualistic or are of a general supervisory nature. He is supported by the principal of the university, who is a full-time highly paid official."
Professor Griffith says the salary more than twice the amount to be paid to the most senior professor of the university—is excessive.
In an interview with *The Times*, Lord Annan said that people suggested there was no need for a full-time vice-chancellor because of the growing complexity of central government.
In November, 1975, Professor Griffith's petition to the university's governing body, the Privy Council, which decided that the vice-chancellor's duties and that there was no legal basis for the payment of a salary is decided by the senate.
Sir Donald Barclay, the present vice-chancellor, receives a salary of one-quarter of the rate a full-time vice-chancellor would receive. He also holds a full-time university post.
Annan steps softly, page 2

Edinburgh to allow entry of 'unqualified' mature students

by Maggie Richards

An experimental entry procedure for mature students is to be introduced at Edinburgh University next year. The new scheme will permit the entry of a small number of mature students lacking the usual qualifications.
But the university's committee on entrance arrangements which has initiated the new procedure has stressed that it is normally in the best interests of students to obtain the necessary entrance qualifications—three higher grade passes, including mathematics or a science or an approved language other than English.
The new scheme, which will apply only to British students aged 23 or over, will allow the selection of mature candidates by two tests of academic aptitude, two essays and an interview. Applicants will also be required to supply the names of two referees.
Candidates will also be expected to show some evidence of achievement in a professional sphere or some other field. All applications will be processed through the Universities Central Council on Admissions.
The new scheme will begin next year, but will be limited to five faculties: arts, divinity, law, music and social sciences, where previous

advanced knowledge of particular subjects is not a pre-condition of study.

About 8 per cent of Edinburgh's undergraduate entrants are mature students, who have generally obtained the appropriate pre-entry qualifications.

Professor N. A. Furness, convener of the entrance arrangements committee, said: "A considerable amount of public interest has focused recently on improved opportunities for the admission of mature students to higher education. It is likely the bulk of mature entrants will continue to be admitted under the existing arrangements. The new scheme involves a demanding course of study and successful completion of a suitable course before entry perhaps provides the best evidence of the candidate's ability and the qualities likely to be necessary for success at university."
"There are, however, likely to be some potential students whose applications could best be considered outside this framework. The trial period we envisage for the scheme should enable us to be a little more flexible in considering some mature student applications over the next two or three years, as well as assessing the value of this approach."

State board is rejected

The Institution of Mechanical Engineers has rejected the idea of setting up a new independent body which would be responsible for the registration of engineers in Britain. Instead, in its submission to the Hirston committee, the institution backs the notion that responsibility for registration should rest with the professional institutions and the Council of Engineering Institutions.

"Even a state registration board composed largely of engineers would be subject to tight control and would tend to become increasingly hidebound", its report states. "Alternatively, state recognition of the engineers' registration board of the CEI would strengthen that body in the eyes of the profession and the public."

The institution believes that licensing is necessary only in certain clearly defined areas of engineering but is not required in general engineering and metallurgical work, partly because of the legal requirements of the Health and Safety at Work Act and other legislation.

State registration and licensing via the existing CEI engineers' registration board would strengthen professional engineering institutions but would also require them to exercise a stringent scrutiny of university degree qualifications.

Davies the polytechnic

Dr John Duncan Davies, principal of the West Glamorgan Institute of Higher Education and former dean of civil engineering at University College, Swansea, has been appointed director of the Polytechnic of Wales.

Graduates are in demand

Students are showing a renewed interest in industry, according to the annual report of Cambridge University Appointments Board.

The report says that the number of first degree graduates entering manufacturing industry was maintained in 1977. Graduates are in demand among industrial employers and it is likely that they will employ 30 per cent more of them this year.

Overall demand for graduates appears to be higher than last year "which was itself by no means a bad year for graduate recruitment". Apart from the increasing numbers going into manufacturing industry there were more opportunities in the public service where jobs have been greatly reduced.

The commercial employers continue to seek a growing number of graduates and firms of chartered accountants who for a number of years have been among the biggest recruiters still appear to have an expanding demand for graduates. The number of teaching vacancies notified to the board, which had dropped by over 28 per cent between 1975 and 1976, was the same as in 1976.

The report says that teaching vacancies are being notified much later in the year because local authorities have to assess their needs.

Open 'only to the affluent'

The Open University is in danger of excluding all but its affluent students, according to the university's students' association. A campaign for mandatory grants for all part-time students has just been launched by the Open University Students' Association.

News in brief

Computer to speed up library lending

Aberdeen University's three libraries are to have a faster and more accurate system of book lending with the introduction of a £120,000 CIL computer system.

Each of the 500,000 books held in the King's College, Science and Taylor libraries will contain a bar-code and each reader will be supplied with a bar-coded card. These will be used at seven "library stations" comprising a visual display unit and a lightpen. The book and the borrower will be identified by stroking the bar-codes with the pen.

Once the system is in full operation, it will also provide the librarians with the books in the popularities of the books in the libraries. Eventually it is intended to hold a short title file on the new national body for higher education proposed by the Oakes report.

Booklet on copyright

A new booklet *Copyright Agreements between Employers and Staff in Education* has been produced by the Council for Educational Technology as a practical guide to the problems of copyright management by staff in educational establishments and for some standard forms of agreement covering its use.

The guide written by Geoffrey Gribb, rights development officer, author of an earlier guide *Copyright Clearance* identifies the issues which arise when staff contribute copyright material or performance to new material produced in educational institutions. It aims to clarify the legal position and gives examples of forms of agreement which may help in reaching satisfactory arrangements between staff and institutions.

Textbook prices double

British academic books have more than doubled in price over the past three years according to the latest figures published by the Library Management Research Unit at Loughborough University.

The average price of an academic book in 1977 was £9.22 compared with £4.59 in 1974, while the proportion of books costing less than £5 has shrunk from 58 per cent in 1975 to 36 per cent in 1977. The most expensive books were again in science and technology, with chemistry and physics at the top of the list.

Poly's new computer

A £450,000 computer is to be installed at North Staffordshire Polytechnic in June. The new unit, an ICL 2960, will be delivered to the computer centre at Blackheath Lane, Stafford, and will replace two System 4/50 computers at present used by the centre. A total of 25 departments at the polytechnic use the centre's computing services for teaching and research projects. Data processing for the administration is also carried out and a computing service is provided for 15 colleges and 60 schools in the Midlands.

APC stakes claim for place on proposed national council

by Peter David

The Association of Principals of Colleges, which represents heads of all colleges formerly grouped under the Association of Principals of Technical Institutions, has made a bid for direct representation on the new national body for higher education proposed by the Oakes report.

In a statement last week the association said: "The APC welcomes the proposal for a national body, together with the recognition that a considerable amount of advanced work must essentially continue in a wide range of institutions, and that at least one principal of a non-polytechnic should be included in the non-polytechnic representation of the provision of higher education. It would appear logical for the APC to have direct representation on the new national body, together with the National Association of Teachers in Further and Higher Education and the Committee of Directors of Polytechnics."

The national body, says the APC, "must avoid becoming an additional hurdle hindering innovation in the development of new courses". It also says that it would be "regrettable" if the APC were to be "relegated to a position of being a mere watchdog, rather than a body which could help to bring about integration of higher education to ensure a better use of available resources in the long term interest of the country."

Prince to officiate at CNAA honorary degree ceremony

An honorary degree congregation is to be held by the Council for National Academic Awards on May 16. The Prince of Wales, the council's president, will officiate at the ceremony.

Honorary degrees will be presented to Sir Michael Crampton, chairman of CNAA from 1971 to 1977; Dr James Black, formerly head of the department of pharmacology at University College, London, and distinguished for his research which has led to the successful treatment of angina and cardiac arrhythmias; Mr W. P. Black, former deputy chairman of the council of the Institute of Bankers and for several years chairman of governors of the City of London Polytechnic; Professor Terry Frost, who holds a personal chair in painting at Reading University; Professor N. Haycock, Professor of Education at Nottingham University for 27 years and currently academic secretary of the Universities Council for the Education of Teachers; and Mr A. H. Wickens, director of laboratories for British Rail, and responsible for research into the design of the suspension for the Advanced High Speed train, making possible high speeds on existing tracks.

A selection of graduates, nominated by their own polytechnic or college, will be invited to attend the ceremony, which is to be held at Guildhall in London. They will be presented to Prince Charles.

Dr Holmes for student post

A senior lecturer in the Open University's science faculty is to be named new pro-vice-chancellor for student affairs. Dr Richard Holmes, aged 42, will take over the post in June. He will replace Mrs Naomi McIntosh, head of the Open University's survey research department.

Foreign students 'hold the key' to world peace

Britain should not lose sight of long-term educational aims when it receives young foreign students, says the international unity or hostility, Mr Peter Hogg, formerly staff inspector with national responsibility for modern languages, warned this week in London.

Speaking at the conference of the Central Bureau for Educational Visits and Exchanges entitled "Young Visitors to Britain", Mr Hogg said that although we should ensure that young people learn our language properly, more important than the English they acquired was their overall attitude towards the British.

"This is very important because the young visitors who are destined with us the politicians, academics and managers of the twenty-first century", he said. "To let them leave unsatisfied is to play with world peace. Therefore long-term educational aims should not be forgotten."

We should make sure that they had accessible tutors, efficient instruction, informal practice in the language as well as evidence of the standards they have achieved either in the form of profile or examination. This should be supported by a friendly environment.

This required an examination of what conditions ensured successful modern language teaching. This was a clear definition of long term educational aims, being professional educators as well as language teachers, a learning objectives with relevance to students' needs, an adequate supply of appropriately qualified teachers, administrative support, good teaching conditions, proper library facilities and "social" support.

Universities wary of N and F exam plan

by Judith Judd

Universities may have to accept two different standards of entrants as they did between the wars if A level is replaced by N and F levels, according to a report on examination reform.

A paper by Mr Arthur Heurden, Secretary of the Standing Conference on University Entrance, says that while universities would look at the more advanced F-level pupils to supply their students, there might not be enough of them to go round.

In a booklet from SCUE on universities Mr Heurden says that if N or F levels more time in the sixth form or at the university would be necessary for those with lower qualifications.

The replacement of A levels by three N levels and two F levels to make the sixth-form curriculum more flexible is discussed in a Schools Council working paper published this week.

If the Secretary of State for Education decided to make the changes the new system would not begin until 1986, at the time when the numbers entering higher education would be falling.

The standing conference says that, "must avoid becoming an additional hurdle hindering innovation in the development of new courses". It also says that it would be "regrettable" if the APC were to be "relegated to a position of being a mere watchdog, rather than a body which could help to bring about integration of higher education to ensure a better use of available resources in the long term interest of the country."

Shortage subject retraining scheme will cost £2.2m

by Patricia Santinelli

The Government is extending its scheme to retrain teachers, qualified teachers will be recruited to teach 500 teachers in shortage subjects at a cost of £2.2 million which will be met by the Manpower Services Commission.

The decision to continue this special programme, now in its second year, was announced by Mr Stanley in the House of Commons. The total number of teachers being recruited in mathematics, physical sciences, craft design and technology is 1,240.

The one-year retraining courses are open to serving teachers, qualified teachers will be recruited to teach 500 teachers in shortage subjects at a cost of £2.2 million which will be met by the Manpower Services Commission.

Speaking about the scheme, after the Budget, Mr Stanley, Secretary of State for Education and Science, said: "This will provide badly needed teachers in certain key subjects where there is still a shortage of staff and where the quality of education needs improving."

"I hope that authorities will make more secondments of serving teachers in the shortage subjects and that training institutions will select candidates very carefully."

Applicants must be aged 28 or over and must not have followed a full-time course of higher and further education for at least five years. But newly qualified teachers who have failed to find posts will also be eligible, although not for ASE support; they will have to seek discretionary or mandatory awards from their local education authorities.

The scheme, which is to be administered by the Local Government Training Board, will provide for the payment to authorities of a £1,000 premium grant in respect of each employed teacher seconded for training. Training awards for mature entrants and teachers not in the training board will be £49.50 a week for students without dependants. Married students will receive an extra £11 a week plus £2.20 for each child. In addition, a student living away from home will qualify for a £16.50 a week lodging allowance. Those living at home whose travelling expenses are in excess of £5.00 a week will receive a maximum of £16.50 a week.

Administrative Memoranda will be sent to a Training and Retraining Unit of the Ministry of Education, Science and Technology, "Training and Retraining to Teach—Mathematics, Physical Sciences, and Craft, Design and Technology" from the Department of Education and Science.

"It involves only a part of the profession; it is aimed only at students, causing convenience (extra spare time on full pay) rather than even minimal hardship in those periods of study. Under the ARMC programme managers will study a concrete strategic problem facing their company and receive a MSc from the CNAA once the project has been completed."

The steering committee suggests a joint AUT-ASTMS withdrawal of academic membership of all voluntary work undertaken for the Government followed by industrial action taken in rotation throughout British universities.

"Such an alliance in the interests of academics as a whole is long overdue and would show as much to the public as to the Government, with which we take our joint struggle."

The steering committee has condemned the existing offer as "totally unacceptable" and described the plan for phased implementation of the agreed scales as "grossly divisive and inadequate for junior staff."

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Mr Rex Osborn, the organizing secretary of the British preparatory committee for the conference, said on Tuesday that earlier forecasts would be made to interfere with the delegates' freedom of speech.

Carter goes into policy studies full-time

Sir Charles Carter, vice-chancellor of Lancaster University, announced his resignation this week. He is to become chairman of the Research and Management Committee of the newly formed Policy Studies Institute.

Sir Charles will take up his new job for six years from October, 1979. He had already announced that he would be spending his sabbatical year from September as chairman of the committee.

He had been chairman for several years of the Council of the Centre for Studies in Social Policy, a research institute which amalgamated with Political and Economic Planning to form the new institute.

Lancaster is co-operating with the PSI to expand the study of education policy, a step supported recently by a House of Commons Select Committee.

In a letter to the university council explaining the reasons for his resignation Sir Charles says: "One of the purposes of the sabbatical leave which I am taking next year is to further this cooperative enterprise between Lancaster and PSI."

"However, if PSI is to make an adequate contribution to the development of public thinking across a wide range of political, economic and social policies, there is need for a good deal of effort to focus its work sharply on the most relevant issues and to communicate the results effectively."

"I have been asked if I would be prepared to give a substantial amount of time to this, as chairman of the committee."

Mr Heurden's paper says that if the universities insist on named F levels and the standard combination is 2F and 2N levels, the new scheme could be more restrictive on the curriculum than A levels.

Schools Council Working Paper 60, *Examinations at 18+*, the N and F studies is published by Evans/Methuen Educational and is available from the Schools Council, 160 Great Portland Street, London W.1, price £4.50.

ASTMS urges dons to take tougher line on tactics

by Maggie Richards

Tougher measures to persuade the Government to improve its offer on university teachers' pay have been urged by the Association of Scientific, Technical and Managerial Staffs.

In a report being distributed to all ASTMS academic staff groups the association's steering committee calls for a joint meeting with the Association of University Teachers in plan a coordinated campaign.

The association, which represents 16,000 university technicians and some other academic staff, suggests the AUT's proposed non-marking of examination papers will not be a sufficiently effective tactic.

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'Day release' programme for senior managers in industry

A new programme aimed at improving the performance of senior managers in industry will cost over £2,000. Their student will have to be given authority to study an important area of strategic policy-making affecting the future of the company.

Before starting the main part of the programme students will spend a four-week residential "orientation" period at the polytechnic's management centre, after which they will spend eight months in their firms, reporting weekly to the centre. At the end of the course participants will be expected to produce a detailed dissertation based on the work they have done.

According to Mr Littlewood the programme—which will be offered at the polytechnic's site at Dunbury Park, Essex—is the first "action learning" course to win approval from the CNAA. It was likely to appeal to many highly-motivated managers unwilling to take a period of years away from their companies to go to business school, he said.

Tories to boycott Cuba festival

Britain's Tory youth organizations this week announced that they are to boycott this summer's World Youth Festival in Havana and called on other youth groups to do the same. They want the British Youth Council, which has taken the chief part in international preparatory days, to withdraw and to join them in denouncing the festival as a communist front activity.

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of the research and management committee, for the next six years. This request is timely since I had for some time been thinking that, if Lancaster is to realize its full potential, it needs the challenge of a change of leadership; in particular a fresh mind is needed to deal with the problems of the likely ending of university expansion in the 1980s."

Sir Charles, who will be 60 next year, has been at Lancaster since it opened in 1963. He says that it is part of the tradition of British universities that vice-chancellors should not normally serve for more than about 15 years.

During his sabbatical year the university's senior pro-vice-chancellor, Mr Philip Bould, will be acting vice-chancellor.



The university and polytechnic student unions in Leicester have each staged a major cultural event in the past two weeks aimed at the city's immigrant community and their own members. Here Mr Simon Ellis, deputy president of Leicester University students' union and Mackenzie Frank, the organizer of the polytechnic's effort, watch a primary school steel band performing on the university campus.

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RESEARCH

Small wars help increase service recruitment

by Peter David

A small war helps to increase recruitment for the armed services, according to a recently completed research project carried out at Lancaster University.

In a statistical survey of voluntary enlistment since 1960 Dr Ian Bellamy, a senior lecturer in politics, has found that there is a strong connection between the level of recruitment and the level of fighting Britain has been involved in.

Nor does the war have to be in an exotic location, Dr Bellamy discovered. Ulster has proved no less of a spur to recruitment than did Aden.

The conventional wisdom is that a little war somewhere is the best recruiting sergeant, and it seems there is something in it, he says.

Pay, too, increases recruitment. Dr Bellamy's analysis suggests that a 10 per cent rise in service pay relative to civilian earnings will produce a 7 per cent rise in recruitment. If service pay lags behind civilian pay, recruitment diminishes at the same rate.

According to Dr Bellamy, the evidence suggests that when there is a clear need for servicemen volunteers appear, and when there is no obvious need they hold back. Advertising, on the other hand, is determined by enlistment rates and does not have much impact.

Unemployment, the project showed, played no part in determining recruitment rates except among army entrants below the age of 18. Every percentage point movement in the unemployment rate in the 18-19 groups of the work force produced an average two per cent movement in enlistment by young recruits.

Navy and air force recruitment was unaffected by changes in unemployment because, Dr Bellamy suggests, their recruits tend to be better qualified and therefore better able to find work in the civilian sector. Few regional differences in recruitment emerged from the study. The Welsh showed a strong preference for the air force, and the Scots, contrary to popular belief, seemed less keen than most to join the army.



A digital globe plotter, originally modelled in the best Heath Robinson tradition, from a string and sealing wax original, is to be marketed next week. Its developer, Dr Lindsay Molyneux, of the geophysics department at Newcastle University, said he had also constructed the first working model from laboratory spare parts after he had made the original mock-up. Now Digicore are selling each device, complete with eight reusable globes, for about £3,000. Dr Molyneux, reader in physical instrumentation at the department, said the device would be of particular interest to astrophysicists in display and study events on the surface of the Earth, Moon and other planets. It was originally developed to help the department study global plate tectonics and operates by translating pairs of longitude-latitude coordinates into a trace on the globe surface. This gives a better understanding than the present system of putting traces on to a piece of paper, he added. Dr Molyneux believes the device could also be used for advertising and could even be used for the blind. Although the device is only just going on sale, Arab countries, where geophysics is a fast-developing science, have shown interest, he added.

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Surrey group develops safe asbestos cement substitute

by Sue Reid

A Surrey University research group has developed a safe and potentially economic substitute for asbestos cement, which has been criticized as a serious health hazard in recent years.

The university's construction materials research group, based in the civil engineering department, has filed patent applications in 20 countries and several industrial firms in Europe have already signed licence option agreements to manufacture and market the new material.

Invested by Dr D. J. Hamant, working in close collaboration with Mr J. J. Zonsveld, the new material consists of a cement matrix containing reinforcing layers of stretched polypropylene film which has been mechanically treated in manufacture. It is anticipated that the new substitute will be on the market within two years as an economic and acceptable substance for asbestos cement.

Continuing research suggests that the new material is far more than just a substitute. It is less brittle, according to the university, and could be used in new applications for which asbestos cement would not have been suitable.

Asbestos cement has been widely used for the construction industry for many years for making sheets for building panels, corrugated sheets for roofing and also for pipes.

guttering and other articles requiring a cheap, moderately strong material which will weather well. The widespread concern in the 1970s about the possibility of a constituting a health hazard—several Scandinavian countries have completely banned its use—has stimulated international interest in finding an acceptable substitute.

The construction materials group, led by Mr R. L. Williams, is one of several research groups in the university's department of civil engineering. It has been engaged in research on fibre-reinforced concrete for 10 years, studying the behaviour of cement and concrete mixes incorporating fibres of steel and polypropylene.

Dr Hamant began studying cement polypropylene mixes in 1968 and first discovered their potential as an asbestos cement substitute in 1976. Mr Zonsveld, visiting reader to the department, established links with an interested company in Holland—DSM—which realized the potential of the new material and granted the research group a one-year contract last October to investigate further the basic properties of the material.

Options to manufacture and market the new material under licence have been signed with DSM of the Netherlands and Norcross Ltd, of the United Kingdom, which has also agreed to support further research at Surrey University.

New council looks into basic adult provision

An investigation into innovation and initiatives in adult basic education is being conducted by the Advisory Council for Adult and Continuing Education. The nine-month study is being undertaken to provide the council's basic education subcommittee with information on provision and ideas for the future.

To carry out the research, the council has appointed Miss Rachel Jenkins, who has been seconded from her post as staff tutor with Bedfordshire's special adult learning programme. Miss Jenkins has worked on the Bedfordshire programme since its inception following the Russell Report in 1973, will be visiting and reporting on basic education schemes throughout the country.

Her appointment was announced by Professor Henry Arthur Jones, chairman of the advisory council's basic education subcommittee, at the conference of the National Institute of Adult Education recently.

Professor Jones urged adult educationists to make their efforts in basic education known to Miss Jenkins through the advisory council's office in Leicester. In particular, she would be interested in local discussions and conferences on basic education, training courses for tutors and experimental provision, he said.

The research findings will be studied by the basic education subcommittee, and recommendations made in the advisory council. Mrs Williams, Secretary of State for Education and Science, has commissioned the council to produce a coherent strategy for adult basic education, including continuing literacy provision.

Early retirement work gets £20,000

The growth in people taking early retirement is to be the subject of a £20,000 Social Science Research Council project at the University of Manchester Institute of Science and Technology.

A study by Professor Cary Cooper and Mrs Ann McGoldrick, members of the management sciences department, will be the first systematic investigation of a trend which is expected to have profound effects on society and the individual.

The project will focus on the social and psychological effects of early retirement and will include an investigation of personal attitudes to it, the problems of adjustment after a life at work, and its social acceptability.

North American News

Carter unveils plans for revamped department of education

from Olive Cookson
North America correspondent

WASHINGTON

The Carter Administration has at last outlined its long-awaited plans for the creation of a separate Department of Education. The President promised to set up a cabinet-level department in his 1976 election campaign and again in January, but bitter infighting delayed the presentation of detailed proposals to Congress.

Mr Carter decided which federal agencies he wanted to be included in the new department only hours before the director of his Office of Management and Budget presented the proposals to the Senate Governmental Affairs Committee.

However, the plans for the department, which would be the country's thirteenth cabinet-level department, contain no major surprises.

In fact the Carter proposals turned out to be very similar to Bill that Senator Abraham Ribicoff, chairman of the Governmental Affairs Committee, introduced more than a year ago.

The Ribicoff Bill has been sponsored by more than half of the hundred senators, so it seems almost certain that the Senate will vote for the new department. But the measure's prospects in the House of Representatives are less certain.

The new department is intended to bring together educational programmes presently scattered around various government agencies and, to use a fashionable word here, give education greater visibility. But many education-related federal activities have been left out of the proposals, because it would be too difficult politically to prise them from their existing owners.

Thus education programmes for veterans, which are administered by the United States Veterans Affairs Department, will not be included in the Department of Education, because the extremely powerful veterans lobby insists that they should stay with the Veterans Administration.

Other possible candidates for the new department that President Carter decided in the end not to include are: the Department of Labour's training and youth programmes, the national endowments for the arts and the humanities, most of the National Science Foundation, public broadcasting, the Smithsonian Institution and the Justice Department's juvenile delinquency programmes.

At the heart of the new department will be the education section of the present Department of Health, Education and Welfare (HEW), including the education-related functions of the Office of Civil Rights.

It will also take in the college housing programmes of the Department of Housing and Urban Development, the Agriculture Department's child nutrition programmes and graduate school, the Bureau of Indian Affairs educational activities, the Defence Department's schools for overseas dependants, all federal student loan and grant schemes except those for veterans, and some science education functions of the National Science Foundation.

Even these inclusions brought protests. For example, the proposed transfer of the National Science Foundation's elementary secondary and undergraduate education programmes to the new department during the summer of 1979, when the department is to be established, is being opposed by departmental bureaucrats.

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While most, though not all, school-level educational agencies favour a separate education department, universities and colleges are generally lukewarm about the idea.

One fear is that the department will be dominated by elementary and secondary interests—in particular by the highest teachers' union, the National Education Association.

Another worry, as John Hopkins president Dr Steven Muller wrote in *The Times* (February 3), is that the increased importance of education in the federal government might lead to more federal regulation and control of universities.

Another risk is that an isolated education department could be more vulnerable to future budget cuts.

As Dr Muller put it: "The major American universities see President Carter's commitment to a Department of Education as a dilemma: risky to oppose lest that should result in disavowal during the process of establishment, risky to support because it might serve less well than what exists now."

If Congress accepts the Administration's proposals, the United States will have a Department of Education with an annual budget of \$17,500m. It will spend more than seven existing departments.

Three-quarters of this budget represents programmes transferred from HEW. The education Department of Health and Welfare, as it will presumably become, will be left with a huge budget consisting largely of social security and medical care benefits, over which it can have little political control.

Not surprisingly, HEW Secretary Joseph Califano fought hard to persuade President Carter not to split his department. Having lost the argument, he said loyally that he would support the President's proposals.

The University of North Carolina stands to lose many millions of dollars in grants from the federal government because it remains—in the opinion of the Office of Civil Rights—a segregated institution.

In future, requests for grants from the university to the Department of Health, Education and Welfare in Washington will be reviewed on a case-by-case basis. If the government decides the awards would further the segregation of black and white students in the state they will not be made. If this procedure had been in effect last year the university would have lost at least \$10m.

The university has failed to satisfy the Government that it genuinely intends to promote integrated education. In North Carolina over 90 per cent of the students are white at formerly all-black colleges and 91 per cent are white at formerly all-white institutions. Blacks constitute nearly one-fifth of the total student body at North Carolina's five campuses.

In response, the university says that the Department of Health, Education and Welfare has not taken enough notice of the problem already existing in the state. North Carolina is being penalized because it had successfully established a number of black campuses.

Mr William Friday, the president of the state university system—the administrative body responsible for the various campuses spread throughout the state—has denied it is defying the government.

Mr Friday commented: "We have refused to take actions that we believe are educationally unwise because we continue to be unwilling to accept unreasonable requirements and because we will not agree to any plan that takes from the university its responsibility to make educational decisions."

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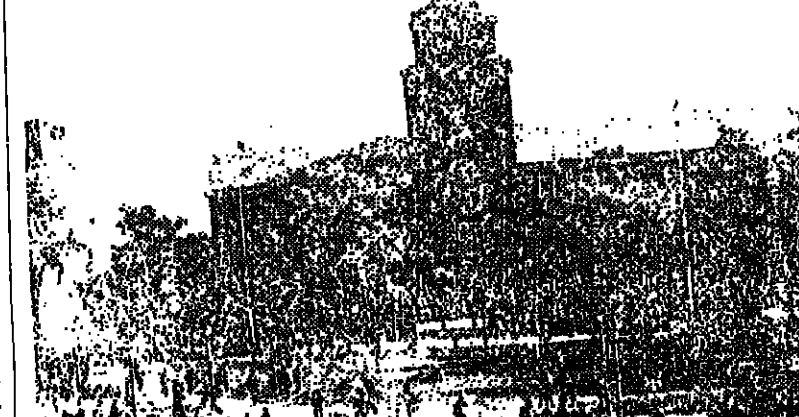
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Brooklyn College campus of the City University.

CUNY: where students are anything but average

from Henry Wasser

NEW YORK

Students at the City University of New York are not like other American students, according to a survey by Dean Lawrence Padell of the university's Office of Program and Policy Research.

The average CUNY student is older than students at most American colleges—half are over 21 and a fifth 30 years old or older. More than a third of the nine senior college students and more than a half of the nine community college students in the autumn of 1976 in enrolment were black or of Spanish origin.

The most important reason given by CUNY students for going to college was preparing for a profession (42.5 per cent). Next was obtaining specialized occupational training (only 14.7 per cent); development of intellectual ability was cited by 13.1 per cent and personal growth and social development by 10.8 per cent.

Seven out of ten two-year community college students hoped to continue for four years and a third intended to get postgraduate degrees. Two-thirds of the senior college students expected to obtain postgraduate degrees.

Dominant curricular interests for men at CUNY were engineering, computer science, physical science and mathematics and accounting. For women education, health services and liberal arts prevailed. Two-thirds of the students said their academic programme was what they

expected it to be and 80 per cent were satisfied with their programme.

The survey was conducted with a sample of 9,500 CUNY students. Comparative data from a survey of freshmen from colleges across America indicates that CUNY freshmen were two and a half times more likely to come from families with annual incomes under \$8,000, nearly three times more likely to have fathers with an eighth-grade education or less and more than nine times more likely to be parents themselves.

So as New York State moves to take over CUNY, it will discover that a student body very different from that of the State University of New York which it presently finances.

Inner city poverty, limited family educational background, the necessity for working while studying, the older age of a student body often with dependants, the probable lower budgetary and educational guidelines not aimed at state public institutions in New York or elsewhere.

Yet this metropolitan student body has similar career ambitions and the same objective of upward social mobility as other public universities.

New York State education and budget officials have not yet revealed any special plans for this different student population while New York City public schools are trying to get rid of higher education responsibilities that have been theirs for more than a hundred years.

Campus concern grows over new accounting guidelines

from Our Own Correspondent

WASHINGTON

Government proposals to change the accounting procedures for universities carrying out federally sponsored research have alarmed American academic administrators, who fear the new rules will cut the major institutions millions of dollars a year each and load further administrative burdens on to them.

The cause of the consternation is a new set of principles for determining the "indirect costs" of research—for example, libraries, administration and utilities—published by the White House Office of Management and Budget last month.

They are intended to ensure that the Government and universities "share their fair share of research costs" and to simplify accounting procedures by introducing a uniform method for all federal agencies.

The universities claim they do neither. The new rules, they say, would substantially reduce their ability to claim back indirect costs from the Government and would involve yet more paperwork.

The National Association of Colleges and University Business Officers (NACUBO) estimates that American universities would lose between \$150m and \$170m a year from the changes.

Stanford University says it would lose \$7.5m annually—in the last fiscal year federal agencies paid Stanford \$9.9m for direct costs and \$2.1m for indirect costs of research work.

The OMB proposals seem technical and obscure to a lay observer, but their meaning is apparent. Frank Riddle and Janet Sweet, Stanford's costing experts, call them "very sloppily written".

Milton Goldberg, of NACUBO, said that when NACUBO and OMB meet next month to discuss the new guidelines NACUBO will first insist on being told what they actually mean.

Two of the new rules that worry universities are: recovery of library costs will be limited to full-time researchers, and institutions will no longer be allowed to reclaim costs of services such as counselling working on federal projects.

They claim, too, that the new rules would place greater burdens on universities than on other non-profit research organizations.

The OMB wants the new costing principles to take effect in October. But it has stated its readiness to change the details after discussions with the academic community.

This dispute is part of a more general argument between universities and government. Government regulations are doing more and more damage to their research efforts, and the administration, under pressure from Congress to make universities more accountable for their spending of billions of dollars of public money, the 1977 budget allocated \$1,500m for federal research and development in academic institutions.

CND members questioned

by Maggie Richards

Researchers carrying out a detailed study of the Campaign for Nuclear Disarmament of the late 1950s and early 1960s are anxious to contact former members of the movement.

The study is being conducted by Mr Colin Pritchard, senior lecturer in social sciences at Bath University, and Mr Richard Taylor, lecturer in political sociology at Leeds University.

For more than 200 ex-members of CND have been contacted and asked about their motives in joining the movement. They have also been quizzed about their attitudes in retrospect, and their view of the organization's achievements.

The researchers believe that because CND was so broad-based it unified age-groups and reconciled political opinion on the right, centre and left. But because the centre was so articulate, they have been surprised that it did not achieve more.

"The average member was highly intelligent, well-educated and able to express himself extremely well," said Mr Pritchard. He believes one reason for the movement's final failure could have been unsympathetic treatment by the media.

But the research team has hailed the organization as one of the major protest groups of the 1960s. It was the middle-class marching, and we had not seen anything like this before in Britain," Mr Pritchard explained.

The team has established that many of the former members of CND went on to take an interest in ecology.

Some of the prominent CND activists have already been approached to take part in the study, including J. B. Priestley, Peggy Duff, Canon Collins and Arnold Weaker.

The researchers hope results will emerge by the end of May.

Organic farming

The Soil Association has entered into a five-year agreement with the National Coal Board to carry out a research project on the 300-acre research farm at Brynwgryn in South Wales.

The aim of the research project is to find out how organic farming compares with other methods in restoring the fertility of soil. Much of the farm has been restored following open-pit coal mining.

Dr V. I. Stewart and two research assistants from the Soil Science Unit of the University College of Wales are conducting the scientific aspects of the research. The farm is managed by the Soil Association.

Esso fuels fellowship

by Robin McKie

Science Correspondent

A new fellowship is to be set up by the Royal Society which is backing from Esso Petroleum which has agreed to give an annual grant of £15,000 for the first seven years of the venture.

The fellowship, earmarked for the physical and applied sciences, will form part of the society's scheme to establish research groups for young able scientists who cannot find entry into universities because of present financial cutbacks.

The fellowship should have an impact on teaching and the society says it is probable that the holder will be based or closely linked with a university or higher educational establishment.

The venture marks a second association between the Royal Society and Esso and comes four years after the establishment of a new Royal Society Esso Award for the Conservation of Energy in which a gold medal and a prize of £1,000 are awarded annually for an outstanding contribution to developing the efficient use of energy. Last year the award was made to Professor J. M. Ward and his research group at the Central Electricity Laboratories, Leatherhead, for their work on conservation in power stations.

The society's scheme to set up new research groups for young scientists has also received a boost of £200,000 from the will of the late Mrs D. R. Howe. The money will be used to form the Mr and Mrs R. L. Howe Research Fund.

Chelsea launches nursing project

Two research projects have been launched at Chelsea College, London, to study the education of midwives and to investigate some of the factors involved in basic nursing training.

The developments are the first involving the college's newly set-up nursing education research unit, part of the recently formed nursing studies department there.

Professor Jack Hayward, head of the department, said the 330,000 nurses in Britain formed the largest single group within the National Health Service and represented an enormous salary bill for the Government. "It was therefore vital to find out if they were being properly instructed so we could get the best out of our investment."

The director of the unit, Mrs Caroline Cox, said the first project would be looking at the role of midwives and their relationships with other branches of the health services.

The study aims to look at the role continuing education could play, not only in relation to the professional planner, but in aiding others concerned with environmental issues, including local councillors and community groups.

One part of the project involves

EEC aids environment study

An examination of the role of continuing education in environmental planning is being carried out by a team from the department of town and country planning at Trent Polytechnic.

The project, which began earlier this month, is being sponsored as a pump-priming exercise by the European Economic Community with an £833 grant. It is being conducted by Dr John Taylor and Mr Ian Hayward and is also being funded by the Council of Europe and the Organization for Economic Co-operation and Development.

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a study of existing provision and new developments in Britain, Denmark, France and Germany. Its other task is to establish new programmes of environmental education and gauge reaction to them.

Seminars designed as updating exercises and to provoke discussion of new issues are to be held for planners and others with a professional interest. Seminars will also be arranged for a wider audience, intended to inform elected representatives, community groups and trade unions.

The department of town and country planning at Trent Polytechnic is already involved in organizing continuing education programmes. To date it has arranged a series of seminars on current planning topics, provided tuition for parish councillors, compiled a publication for the Local Government Training Board, and participated in Workers' Educational Association courses.

The project will focus on the social and psychological effects of early retirement and will include an investigation of personal attitudes to it, the problems of adjustment after a life at work, and its social acceptability.

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Research councils launched

from Edward Sheffield

OTTAWA

Two new research support councils, headed by career civil servants, have been launched in Canada.

André Fortier, formerly time director of the Social Sciences and Humanities Research Council (SSHRC), has been appointed to head

Australia

Student union fees row reaches stalemate

from John Kirkaldy

SYDNEY Legislation in two Australian states is at an impasse over the controversial question of student union fees. In the Labour-controlled states of New South Wales and South Australia, the Upper Houses have refused to pass legislation that guarantees student unions the right to collect compulsory service fees. In New South Wales, the government of Mr Neville Wran is prepared to allow the state's six universities to make by-laws on charging fees for amenities and services, "whether or not of an academic nature". Most Australian universities' senates have always claimed this right but it has never had the backing of law. Under the legislation, it is likely that an individual student would be granted exemption from the paying of fees on conscientious but not political grounds. It would not be possible, for example, for a Liberal student to claim exemption because he or she objected to student unions supporting pro-Labour or radical causes. The Liberal opposition in New South Wales has opposed the legislation, saying that university authorities should not pay money to any organization that might spend on non-university purposes. The shadow Minister for Education, Mr Neil Pickard, described the Australian Union of Students (AUS) as such an organization and accused it of "a flagrant use of compulsorily acquired student funds for non-university purposes". The background to the whole dispute is long and bitter. Last year the state government of Western Australia passed legislation banning compulsory student unionism and a similar move is still possible in Queensland. The Victorian government is at the moment drafting legislation to give students the right to opt out of compulsory membership of any university organization. In November, 1977, a decision by the Victorian Supreme Court decided in favour of a case brought by a group of students from the

University of Melbourne that student unions should be restricted in their use of funds for political purposes (THE TIMES, January 6). These moves were only part of what was a nightmarish year for the Australian Union of Students. Urged on by groups of Liberal students, 11 institutions seceded from the organization and in several other universities the majority supporting affiliation was small. In August, the union's travel organization went into voluntary liquidation, although it was subsequently rescued by a consortium of international airlines. Liberal students claim that student unions have been undemocratic and have financially supported causes that are wasteful and radical. In January of this year, the AUS council meeting cut the organization's budget by about a third to \$A425,000 and asked the student newspaper and many official positions. Some encouragement for student unions came from a decision in February of the New South Wales Supreme Court. It ruled that the University of New South Wales was entitled to charge compulsory fees and to pay part of them to the students' union which, in turn, had the power to apply them in accordance with its constitution. The court made no pronouncement on the paying of money to the AUS or a definition of how it should be spent. It did, however, conclude: "The [students' union] constitution is to be given a fair and reasonable construction. Its language is not to be restricted by a priori concepts of 'non-university purposes'". Australian universities have in general given cautious support to student unionism. Service fees which they collect are spread between student amenities (sports facilities, restaurants and student unions, who in turn pay a per capita fee to the AUS). On a more philosophical level, Australian universities are anxious to safeguard the principle of university autonomy and resist outside interference.

Republic of Ireland

Regional colleges 'becoming too academically oriented'

from John Walshe

DUBLIN Ireland's nine regional technical colleges (RTCs) are catering more and more for students with an academic background, a lecturer at Galway RTC told a student seminar last week. The original function of the colleges was to provide a third level "topping off" for pupils from vocational schools, the technical sector of post-primary education. But the academic secondary schools now dominate entry to an alarming extent. In 1976, for example, academic pupils took 1,419 first-year places in the colleges, while vocational leavers took only 283. Mr Dennis Murphy added that this had implications for working class access to higher education, because vocational schools contained a high proportion of children from the lower socio-economic groups. These were being

pushed out by lack of finance and rising entry standards due to excess demand. One problem was that the colleges had expanded only slightly in the past two years, after three years of rapid growth. Because of the shortage of places, the colleges were opting for more academic pupils. There was also a desire on the part of the colleges to raise their status, Mr Murphy claimed, and they were doing this by upping the universities. "There has also been a rise in the aspirations of students. Originally the certificate was the goal of most, but now most want a diploma or degree. A third sector may soon be needed in look after the non-academic students", Mr Murphy told the conference. He recommended that the National Council for Educational Awards should be given planning functions as well as the power to grant awards.

Norway

Enrolments show 10pc fall

Ten per cent fewer new students entered higher education during the last academic year than in 1975-76, according to figures published by the Norwegian Central Bureau of Statistics. Intake to the humanities faculties fell by 9.8 per cent, with the universities of Oslo, Bergen and Tromsø being worst affected. Provisional figures for last autumn show admissions to the Tromsø faculty as 25 per cent lower than expected. Overall, total student numbers fell slightly from 40,300 to 40,100, though the proportion of women rose to 36 per cent and the share of all Norwegian students studying abroad fell to 6 per cent. Of the mid-1960s, women only accounted for 24 per cent of students and 15 per cent had to find study places abroad. Women have made considerable inroads into traditionally male-dominated subjects. They now account for 32 per cent of veterinary medicine students, 29 per cent in law, 18 per cent in agriculture and 12 per cent in business administration, as well as 42 per cent in the social sciences.

Sri Lanka

Violence leads to campus reorganisation

from D. B. Udalgama

COLOMBO Sri Lanka's university system is to be reorganized and the residential system abolished following violence stemming from political unrest on the campuses. Education Minister, Mr Nissanka Wijeyeratne, who recently also took on the new higher education portfolio, said the present six campuses of the University of Sri Lanka would function as administrative centres. There would be about 30 affiliated university colleges in various parts of the country, which students could attend from their homes. Accommodation has been a major problem on all the campuses. Only Peradeniya was originally conceived as residential and political pressure compelled it to admit external students. There are some hostels on the other campuses but many students live in primitive conditions in private lodgings and are exploited by landlords. The government feels that the recent violence, which blew up because a minority of students had been incited by "defeated political elements". Student unrest has been growing since February, when a lecturer at a student of the engineering faculty at Peradeniya, were suspended for allegedly hoisting black flags or putting up anti-government posters on the day of the installation of Mr J. R. Jayawardene as President of the Republic.

West Germany

Postgraduate awards scheme extended

by Günther Kloss

The West German Parliament has extended the *Graduiertenförderungsgesetz* (Postgraduate Awards Act) which was due to lapse on December 31, to the end of 1981. The law, which originally came into force in September, 1971, regulates maintenance and travel grants for postgraduate studies. Awards may be made for either a second course of instruction, which in fact amounts to a second undergraduate course, or postgraduate university courses leading to higher degrees or diplomas or to a doctorate. Since 1976 grants have been given at a rate of DM300 per month (£200) with dependent and other allowances. Fewer applications for awards have been received during the past two years than previously. This may be the result of the loan clause and there is some concern about this development. The federal government has been asked to report by the autumn on the effects of this loan arrangement.

Holland

Graduate job prospects remain gloomy

from John Richardson

THE HAGUE More than 1,300 Dutch graduates who finished courses in 1977 are still out of work. Three hundred of them are engineers and more than 400 are psychologists and sociologists. The total number of unemployed academics now stands at over 4,000, up from 3,500 in 1976. The unemployment rate is 10 per cent of all graduates and an increase of more than 30 per cent since the end of 1975. The biggest unemployment increases are among those qualified in sociology (45 per cent increase), psychology (71 per cent increase), social sciences (121 per cent increase), technological subjects (68 per cent increase) and chemistry (48 per cent increase). The future looks even more sombre. A research group set up by Dr Ger Klein, the former State Secretary for Higher Education, has forecast that by 1990 the supply of graduates will exceed demand by at least 40 per cent. Many of the highly qualified take jobs which in the past would have been considered beneath the dignity of the academic. The number of people more than that of the less highly qualified unemployed workers. There are still high

Italy

University shake-up planned bid to ease unrest

from Uli Schmetzer

ROME Italy's ruling political parties have finally reached agreement on a four-point university reform project. Ironically the protracted reform was a sudden leap forward with politicians, now anxious to defuse the discontent on campuses, labelled by sociologists as "breeding grounds" for left-wing radicals like the Red Brigades, responsible for the kidnapping of Signor Aldo Moro. The cynical academic commented: "Now that one of them has been hit they are suddenly eager to get on with it." There is little doubt that the Moro incident has created an atmosphere of political solidarity which is right across party lines—a climate conducive to reform of the university system that for nearly a decade has relied on broken promises. Both the ruling Christian Democrats and their tacit supporters, the Communist Party, have attempted for years to wrap the reform laws in a package bearing their own political label. After all, Italy's 1.2 million highly politicized students are considered a decisive force in the delicate balance of power. When the Christian Democrats proposed the status quo of a university system heavily infected with patronage and nepotism, the communist-projected reforms pushed it into the communist camp. Aware of each other's ambitions, neither party was willing to compromise while both viciously decried the snowballing campus violence—in turn caused by badly overdue reforms. As Italians followed the fate of Signor Moro the parliamentary commission dealing with university reform leaked news that the "major parties" had reached a consensus which was to be presented to the legislature "as quickly as possible". In a climate definitely favourable for a "Great Leap Forward", Italy's muddled legislature might even surprise its sceptics by turning the proposals into a bill. The proposals, quickly nicknamed "the Four University Knots" are:

- (1) A National University Council to replace the higher education ministry. It would include members representing government, the professional students and research organizations. It would also be the world of commerce.
- (2) The reorganization of appointments system with academic and non-academic posts. This would break down of whimsical faculty department appointments and create a more professional access to posts.
- (3) Adequate wages and conditions for the teaching staff. The country's 30,000 lecturers and professional assistants have become the poor relation of higher education system.
- (4) The implementation of cabinet decision two years to build 12 new universities, would include a class of absolute priorities in the country of Rome's second university.

South Africa

Student papers fight bans

from Martin Feinstein

CAPE TOWN South African student newspapers have clubbed together to give legal protection to student journalists after another wave of bannings and police raids. The South African Students Press Union, an alliance of 13 student newspapers formed after an editors' conference at the University of Natal four months ago, has registered the Student Publication League Trust in Cape Town. The main aim will be the provision of legal aid for student journalists charged under the Publications Act, which includes a retrospective provision making it an offence to publish a newspaper that is subsequently banned by the censors.

Judith Judd finds London's new vice-chancellor in a cautious mood

Annan steps softly in the Senate House

Lord Annan, ebullient and idiosyncratic, approaches his new post as London's vice-chancellor with uncharacteristic caution. His appointment coincides with the passing of the University of London Bill, a milestone in the upheaval and Murray report on the university's government. The argument of the new act is to allow the university to reform itself and extend the participation of staff and students in its governing bodies. The reorganization of Senate House has also caused a disturbance from which the university is still recovering.

Lord Annan has talents well-fitted to the task. If he is to be a successful vice-chancellor, he must also be a diplomat, an art he learned during the war when he served in military intelligence. His difficult task was to tell military government who had taken London to its knees and to lift their ban on his political activities. He was the most likely future chancellor of West Germany. He recognizes that vice-chancellors have to suppress their individuality. "You can't just sound off on all the things you would like to do," he says. "You are bound to recognize that other people will think you are speaking for them." This does not mean that he expects to retreat into the safety of evasion and platitude. "One should not economise on truth. Sometimes you have to say quite bluntly," he quotes his reports on the 1974 troubles at Essex University as an example of diplomacy and plain speaking. The report itself may not have appeared particularly tactful, but the comments, he points out, were private. He sees his appointment as a recognition of the fact that vice-

chancellorships are becoming more managerial. The fact that he is a University College has no significance, he says. The idea that the college has a preponderance of influence in the university is wrong. It has no more than its share of the administrative places. The vice-chancellor could well have come from another school. His own administrative experience is vast. Even before he became provost of King's College, Cambridge, at the age of 39, he was in several university appointments, though "I had never thought of academic administration as particularly my sort of thing". At Cambridge he tried to broaden the social class of undergraduates coming to his college and was involved in several university committees, though "I had never thought of academic administration as particularly my sort of thing". When the offer of the job at University College came in 1966 he had a difficult choice to make. Either he could stay at Kings and in Cambridge, which he loved, until he retired or move. Characteristically, he was influenced by University College's reputation for scholarship and research. At Kings, he felt, the tremendous dedication of the dons to their undergraduates meant research received a favour which he provided by creating a research centre. There can be no doubt about Lord Annan's priorities as vice-chancellor. As provost of University College he has put the emphasis on teaching and research and has preferred to pinch and save in every other quarter but this, in a letter to *The Times* last year, he complained of the working conditions of his staff and students in the college's decrepit nineteenth century buildings, but he approved of the institution's austerity. Apart from the provost, he says, the staff's creature comforts are rather different from those at Cambridge.

Maybe his dedication to scholarship stems from the abandonment of his own scholarly activities when he became provost of Kings. He still enjoys writing reviews and essays but has lingering regrets that his book on Leslie Stephen has had no success. If teaching and research come first, what must go? Lord Annan says that every penny London University spends at the moment is justifiable. He thinks, however, that the university should look at its role in continuing education which could be a growth motor. He hopes London will always have some external degrees but thinks the reduction in their number after the establishment of the Council for National Academic Awards and the Open University is justified. In his final problem London must face immediately is over medical education. The university will have to do some hard thinking, he says, if it is to cope with the Department of Health and Social Security demand that medical education in London must be cut down coupled with the insistence of the Department of Education and Science that London medical schools must keep up their numbers. In a speech given in 1976 he said "I have many medical schools can London afford to run? Or if you decide to keep the same number, can each be staffed and teach all the subjects that are being taught now? We have been evading this question for 30 years. Are we at last going to face it?" In the debate about the government of London University Lord Annan says that he believes an overwhelming desire for decentralization has emerged. "I take to this very kindly not because I have been head of a school but because of my army training. When you are a staff officer you are told that the only justification for your existence is to help the people who are doing the fighting. It is exactly the

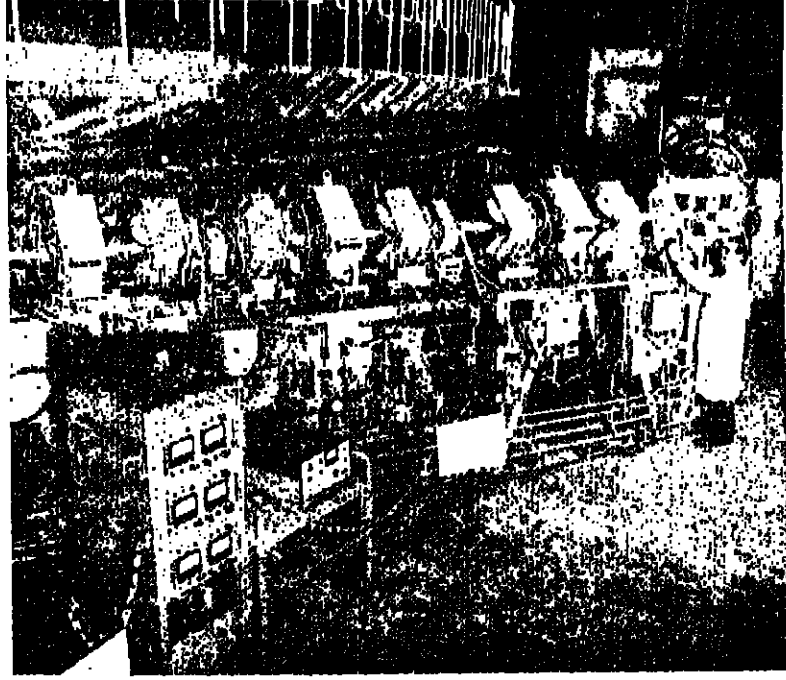


Lord Annan: "You can't just sound off on all the things you would like to do."

that they will go very wrong unless they listen to the voices of those who can't rule." Apart from the reforms he tried to push through in Cambridge, his other great reforming activity was his involvement in the creation of the new universities as a firm advocate of university expansion. Recently, he has become increasingly concerned about the maintenance of academic standards. "Universities must put their weight strongly behind people who are literate and numerate. It is clear we are going to get a very wide variation in attainment between entrants in the 1980s." Departments will have to work out how much time they want to spend on remedial work. Are his reforming days over? He believes the great era of change and reform in higher education is over "but perhaps this is just a sign that I am an aging dinosaur." London University will be interested to see whether the Whig small group can rule. I also believe

Neutron research will rise from the ashes of Nimrod

Britain gets 'a good bargain' as one nuclear research device is shut down and another is built in its huge underground shelter



A scientist makes an adjustment on the outside main ring of Nimrod during an experiment.

Committee had taken over the Rutherford Laboratory from the former National Institute for Research in Nuclear Science. It cost £7m to construct then and formed part of a growing complex at Rutherford, established in 1957 as a national research centre for nuclear science. The main feature of Nimrod is a large ring-shaped electromagnetic field of two million tons of lead. A pulse of protons, one of the two main constituents of an atom's nucleus, is injected into the machine and these are accelerated through the ring by the electric field. In less than three quarters of a second, these are forced round the ring at nearly one million times the speed of light. The electric field strength is constantly altered to confine the protons to their designated orbits. Every two seconds, the machine produces a pulse of two thousand billion protons and these are used

to bombard various targets round the ring. This in turn produces further beams of rarer particles such as pi and K mesons and the interactions of these, and other stable products, form the basis of the studies carried out there by various university departments and SRC groups. The streams of particles are then passed through a series of detectors and details of the millions of interactions are stored on magnetic tape or film for analysis by the Rutherford's central computer. Now the last nine experiments are being wound down and only one of these, run by Dr Peter Litchfield, in collaboration with Edinburgh University and Westfield College, London, will be transferred to CERN. British university departments are now making arrangements to undertake research at Geneva and Dr Litchfield stressed that the transfer would be relatively straightforward. There would also be no loss of research possibilities because there was nothing that could have been done at Nimrod that cannot be carried out at CERN. And describing the role of Nimrod, he added: "There were no unexpected discoveries, but the steady gathering of systematic data helped build up a pattern of understanding and led to the development of the quark model as the basic of matter." On June 6, the last pulse of particles will be boosted round Nimrod and then the "mighty hunter" whose annual bill for electricity alone was £1,250,000, will be closed down. The ring will be cleared of equipment and the experimental halls emptied. Fortunately, it will not be the complete end for Nimrod, for its huge underground shelter, 200ft in diameter and covered by a 16ft layer of concrete, is to be used to house a new nuclear research device, a Spallation Neutron Source. This will have the same basic structure as the old machine and will even incorporate the new linear accelerator scheduled to have been used for Nimrod until its closure was announced. However, the proton beams will be less energetic in the new machine and instead will be used to produce streams of neutrons from a uranium target. The way these neutrons are scattered or absorbed by materials put in their path will give scientists new insights into their internal structure, said Dr Geoff Manning, head of the new project and deputy director of the Rutherford Laboratory. The SNS machine will be used to study the properties of solids and liquids and will also have medical and industrial applications. Dr Manning added that the new project would provide unique research facilities and marked a resurgence from the old Nimrod approach of allowing only a few large-scale experiments to be carried on for years at a time. Instead a variety of small science projects will be undertaken for short periods. The SNS, which will be the neutron source, will be more intense than any other device in the world, will cost £7.8m to construct with a further

£3.1m needed for instrumentation construction. Building the SNS from scratch without using plant and equipment from Nimrod would have cost a prohibitive £3.5m. Indeed, Nimrod is so ideally suited for conversion, that Mrs Williams, Secretary of State for Education and Science, announcing the Government's decision to build the SNS, described it as an extremely good bargain. "This must be one of the largest projects undertaken in this country for a long time and it promises to take the United Kingdom to the forefront of research involving the use of neutrons," she added. When the Government's decision was announced in June last year to the Rutherford staff, it was greeted with loud applause for otherwise hundreds of highly skilled scientists and technicians could have lost their jobs when Nimrod closed down. Dr John Thresher, head of the high energy physics division at Rutherford, admitted that morale dropped badly at the laboratory when the SRC revealed the shut down plan because it could no longer support high-energy physics research at home and abroad. However, with the announcement of the SNS construction and other scientific developments at Rutherford, including laser, computing and engineering research, morale was now as high as ever, he added. Because research was now based on a wider range of sciences, it was felt that the future of the Rutherford Laboratory was now far more secure. However, Dr Thresher stressed that work on high-energy physics was by no means at an end at Rutherford for many scientists and technicians would still be involved in constructing experiments and providing computing back-up services for research at Geneva. It is certainly a fitting end for such a mammoth research tool that the expertise Nimrod helped develop should continue to aid ever-broadening scientific fields.

Robin McKie
Science correspondent

Broadcasters unite in search for ways to help the young

The novelty of collaborating on a major research project has almost, but not entirely, worn off for Jean Sargeant of the Independent Broadcasting Authority and her counterpart at the BBC, Neil Barnes. They have just embarked on a joint study of ways in which television and radio might be used to prepare young people for adult and working life.

The project is in itself a landmark for broadcasting. It is the first occasion on which the BBC and IBA have combined forces to tackle an issue of common interest.

It has been a joint venture from its inception—a lunchtime meeting between educational broadcasting executives from the two organizations, where it was discovered the IBA had just completed a study of the 16 to 19 age group, while the BBC was about to launch its own investigation.

Both organizations had also been engaged in independent talks with the Manpower Services Commission about the role of broadcasting in influencing young people, so it seemed a natural development to link up for a major feasibility study on the subject, sponsored by the MSC and the Gubbenkian Foundation.

The project, which began on March 1, aims to examine current provision for young people in both the general and educational broadcasting spheres. Its major task will

be to consult the consumer and all the supporting agencies in order to obtain external views on the role of radio and television in the future.

By the end of June, when the project ends, the research team aims to produce a set of working models for consideration by the broadcasting authorities. (One of the reasons why the two organizations have been able to bury their differences so easily has been the recognition that in this particular area there is plenty of potential for everyone.)

The research will concentrate mainly on the way in which broadcasting might be used to effect the attitude of young people to work, principally because there will not be sufficient time to explore other areas in the present study, and because of a belief by the team that many of the programmes which might result would be relevant outside the work environment. It will also examine possible developments using regional television networks and local radio stations. Young people in the 14 to 19 age group are acknowledged to be listeners rather than viewers, so

the team is especially keen to look at this area.

Other spheres for investigation include the operation of counselling services and telephone referral systems.

But one of the most important aspects of the study will be its concentration on the need to link agencies involved with young people to broadcasting initiatives, both at national and local levels.

In this respect the team is anxious to obtain the views and ideas of these agencies. Mr Barnes explained: "We are interested in groups engaged in some sort of educational or social activity. Our belief is not just to look at young people, but also to consider those who have care of young people."

"We would like information about new approaches in careers guidance, ways in which the media could be used to aid young people in their choice of jobs; new approaches in counselling; and new approaches to the teaching of basic study skills; also alternatives to employment."

To make the study as wide-ranging as possible, the team wants to

hear the views not only of the larger agencies such as the MSC, industrial training boards and the Council of Local Education Authorities, but also the opinions of local further education colleges and individual careers officers.

Mr Barnes said: "People closely in touch with young people may have ideas about the use of the media in their own area. Further education colleges may be interested in some form of collaboration. Until now these projects may not have appeared feasible, but we may now be able to develop these ideas into working models which can be submitted to the IBA and BBC for consideration."

During its investigation the team will also be examining the problems of accommodating different groups of young people—those living in rural areas, and those from urban environments; the age gap dividing school leavers from 19-year-olds; and the variation in working for a large organization or a small family firm.

For the consumer consultations the team hopes to commission an

independent study, possibly involving small discussion groups of young people in various parts of the country and encouraging them to comment on aspects of the study. It will also be gathered about attitudes to work, ambitions and expectations in life.

Employers may also be approached for their responses to some of the preliminary models, which the team compiles.

The study has also recruited a research assistant who will be gathering statistical data and preparing social and employment trends. There will also be a comparative study of developments in North America and Europe.

At the end of the four-month study, the team's findings—drafted by their proposed working models—will be forwarded to the project's steering committee, which is being chaired by Peter Braham, of the Gubbenkian Foundation. It includes Richard Hoggart, chairman of the advisory committee for adult and continuing education, and Geoffrey Holland, director of special programmes for the Manpower Services Commission. Representing the Trades Union Congress on the committee is Mr Roy Johnson, of the TUC's education committee.

Comments about the role of broadcasting in meeting the needs of young people should be sent to Young Adult Study, 5 Tavistock Place, London WC1.



A long, glorious and beneficent existence

University College London prides itself on being Britain's first modern university. It is a claim made with some justice. When it was founded the only existing universities in England were those long established at Oxford and Cambridge—"the two great public universities", Bentham called them, "warehouses and nurseries of political corruption."

Membership of the Church of England was necessary for admission to the one and for graduation from the other. This requirement in itself excluded a good many from higher education; others were kept out by the social restrictions of Oxbridge, the very high cost of residence there and by the characteristic intellectual backwardness, especially when compared with the universities of the continent or of Scotland.

It was to cater for the greatly increased middle class brought about by the industrial revolution that the college was founded. It was to have no social or religious barriers to entry, and it was to make available teaching in an enhanced range of subjects, many of them new to higher education. It began as the self-styled "University of London".

Contrary to general belief, Jeremy Bentham was not the founder.

In fact, Bentham played a small, personal role in the establishment of the college. He certainly gave his blessing (and a degree of financial support) to the move to found a university in the largest city in Europe and the only capital of any significance without one, and the founders owed a considerable intellectual debt to him.

The college was in fact founded by what Bentham called "an association of liberals". The leading roles were played by an improbable duo formed by a poet and a lawyer. Credit for the original proposal must go to Thomas Campbell, the now forgotten Scottish poet who was a leading figure in London literary society in the early nineteenth century. On a visit to Rome in 1820 he had been impressed by the quality of both professors and students at the newly-founded university there, especially by the atmosphere of intellectual excitement. He formed the idea of establishing "a great London University" on the same principles.

Campbell's idea began to take

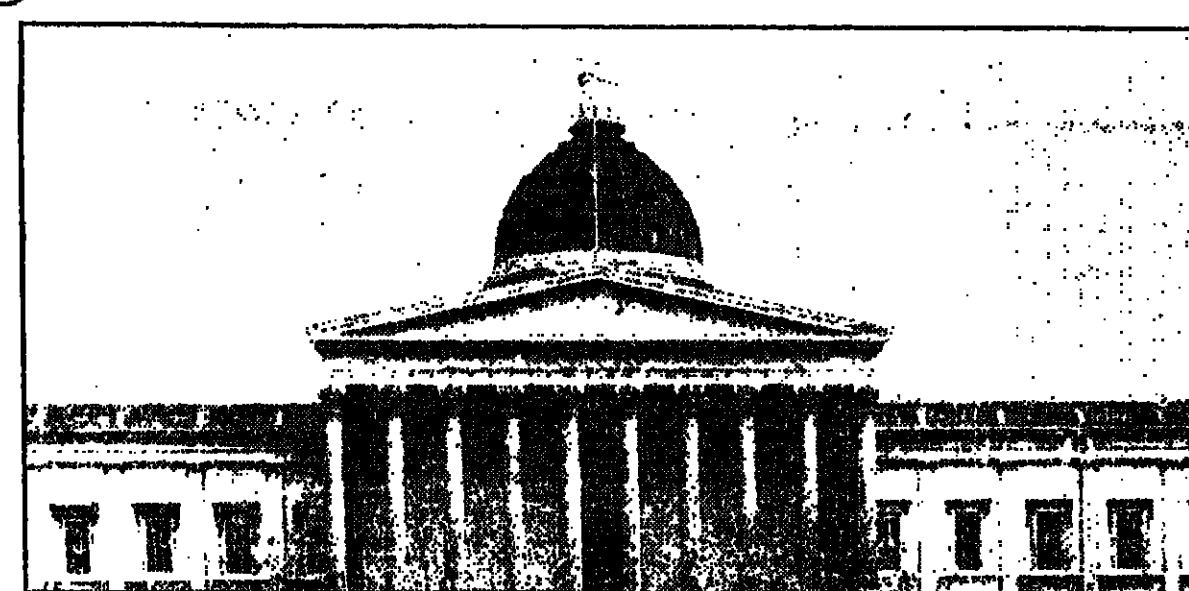
The idea in England of the modern university was born 150 years ago when University College was founded. It was the first place to open its doors to students of any or no religious faith, the first to proclaim its determination to teach subjects hitherto unknown in the English university curriculum such as medicine, physics, engineering, modern languages and political economy. And the first to insist that the professors and their staffs must research into the subject they taught. Today its roll of Nobel Prize winners and of Fellows of the British Academy and Royal Society are

evidence of its dedication to scholarship. This special supplement tells something of the achievement and work of the college. At present this work is hampered by the cuts which universities have endured in recent years and by the burden of maintaining old and in some cases decrepit buildings which require us to put aside a higher and higher proportion of the UGC grant which formerly was used to fund posts for teaching and research. But the flow of grants from research councils, foundations and industry continues and University College will ride out this ill weather as it has often done in

the past. Writing in the Edinburgh Review on the college's foundation, Macaulay said that it would "vary with the necessities and facilities of the age", and the resilience of its members to adapt to the change of the times will be matched by their determination to maintain the standards of the past.

Noel Annan

Lord Annan is vice-chancellor-designate of London University and provost of University College London.



1870s: the library was grossly inadequate until the first decade of the twentieth century and there was no Great Hall until 1927 (and it was entirely destroyed by bombing in 1940). Financial difficulties dogged the great hopes right from the beginning.

Despite the money troubles and despite the snide attacks of the Establishment on the radical infidel college, and "the godless institution of Gower Street", the college was ready to open in October, 1828. "It seems so short a time", wrote Zachary Macaulay's daughter Selina, "since the whole scheme was planned that it reminds me of Alladin's enchanted palace which sprung up in a single night."

Its initiation implies success, the college had achieved it before the doors were opened with the founding of an Establishment rival in King's College, itself to be opened in 1831. Eventually, in 1836, the two were linked through a new body established as the "University of London" which was to award degrees to their students, and to the students of other approved institutions. The college then gave up its original title, and received its first charter as University College, the name by which it has been known ever since, though it is a possibly misleading one in that it suggests an Oxbridge rather than a continental or Scottish model.

Its "horoscope" was published in the pages of the Edinburgh Review by Thomas Babbington Macaulay, Zachary's son, before the building began. "We predict", he wrote, "that the dawn by which it has been assailed will die away, that it is destined to a long, glorious, and a beneficent existence, that, while the spirit of its system remains unchanged, the details will vary with the varying necessities and facilities of every age, that it will be a model of many future establishments." A very rash prediction at the time, it turned out to be remarkably perceptive.

Negley Harte, John North

Mr Harte is a lecturer in economic history and Dr North a lecturer in ancient history. They have produced a pictorial history, "The World of University College London, 1828-1978", which is being published to coincide with the exhibition.

more specific shape following publication in The Times in February, 1827 of a powerful open letter on the subject he addressed to Henry Brougham. Brougham was also Scottish by birth and upbringing, a brilliant man, one of the founders of the Edinburgh Review, who had moved to London to seek commanding offices in the law and in politics for his versatility and energy.

Bentham regarded himself as a Benthamite, as a believer in the utilitarian principle of "the greatest happiness of the greatest number", though it has been claimed that in his view the greatest number was number one. His extravagant style smacked of a man bent to money, but he was a man who got things done.

Campbell and Brougham had in fact been brought together on the project by Isaac Lyon Goldsmid, a millionaire financier. Later to be the first Jew to become a baronet, he it was who, together with two other rich City promoters, before the new university was even officially constituted, bought for it an eight-acre site in Bloomsbury on the fringe of the then built-up area of the expanding metropolis. Some months later, in February 1826, the college was brought into formal existence with the signing of an elaborate "Deed of Settlement". From among the "proprietors"—the shareholders who had bought shares at £100 each—

24 were elected as the founding Council. They were a distinguished group: as well as Campbell, Brougham and Goldsmid, they included Zachary Macaulay, George Grote, George Birkbeck, James Mill, and Joseph Hume. The Catholics were represented by the Duke of Norfolk, and the Whig aristocracy provided a number of other titled luminaries such as Lord Lansdowne and Lord John Russell. The various progressive influences rubbed shoulders readily with a number of wealthy supporters from the City.

Another important strand in the origins was represented by Francis Augustus Cox, the well-heeled Baptist minister of Hackney. It was established as a fundamental principle of the new institution that religion in any form was to be neither a requirement for entry, nor a subject for teaching. As a corollary it was decided that no ministers of religion should sit on the Council, and Cox had to serve therefore as honorary secretary until he became librarian in 1827. He had been a leading figure in non-conformist moves to found a new university in London, moves which Brougham took under his own wing.

With supporters such as these, drawn from a variety of different quarters, but all in their various ways outside the establishment, it is hardly surprising that the Tory government of the day rebuffed the soundings made towards obtain-

Exhibition of life and riches

ments will be opening their doors to visitors, and various treasures displayed. Thus from the large collection of paintings, drawings, and engravings contained in the College Collection, some originating in the Slade School, others from bequests and donations, a selection of fine pieces will be shown.

A second highlight is the collection of sculptures by John Flaxman which fill the gallery underneath the great central dome of the College. Here visitors will not only be able to see Flaxman's remarkable carvings, but also inspect objects and documents which illustrate the earliest years. On show here will be original deeds and legal documents, personalia of the founders and early professors, contemporary cartoons, caricatures and publications.

This historical display, surrounded by a valuable sculpture collection, leads on to the first part of the central exhibition in which the work of the individual departments past and present will be presented in a series of linked and vibrant displays, including appar-

atus, portraits and publications. Audio-visual presentations will show the work of the Slade School, and of research into phonetics and linguistics. Tape recordings will give a sample of the varieties of English usage discovered by the enormous research project now being run in the English department to survey English usage and place names. The development in the history department of a study course unique in Britain—maritime history—will be described, as also its close consultative connection with the BBC's popular *Oceanic Line* series.

On the scientific and technical side, several exciting projects will be illustrated. A detailed historical survey by the chemistry department focuses particularly on Sir William Ramsay and his discovery of inert gases while the department of human genetics and biometry will show how the subject has developed from Francis Galton's early measurements and show an example of modern genetic counselling. From the department of physics and astronomy comes a

space satellite and an infra-red telescope.

The original apparatus book of Dionysius Lardner, first professor of natural philosophy, which has recently been discovered will be on show, as will a fine large electrostatic machine of the mid-nineteenth century. The department of mechanical engineering will be illustrating some of its work on oceanic engineering.

University College is, of course, a triumphant manifestation of the practical philosophy of Jeremy Bentham. Although small, he is very much its tutelary spirit. It is fitting, therefore, that his works are being edited from the college, and books and manuscripts by him will be on show. Above all, his benign and remarkably well-preserved figure will provide over the whole exhibition being centrally placed in the main exhibition area.

A presentation of the college will not be complete without the visitor seeing some of its treasures. In a

small dining room which is adorned with murals painted by Rex Whistler for Lady Diana Conyer and rescued from her house at 90 Gower Street during its demolition, a sample of college treasures will be shown.

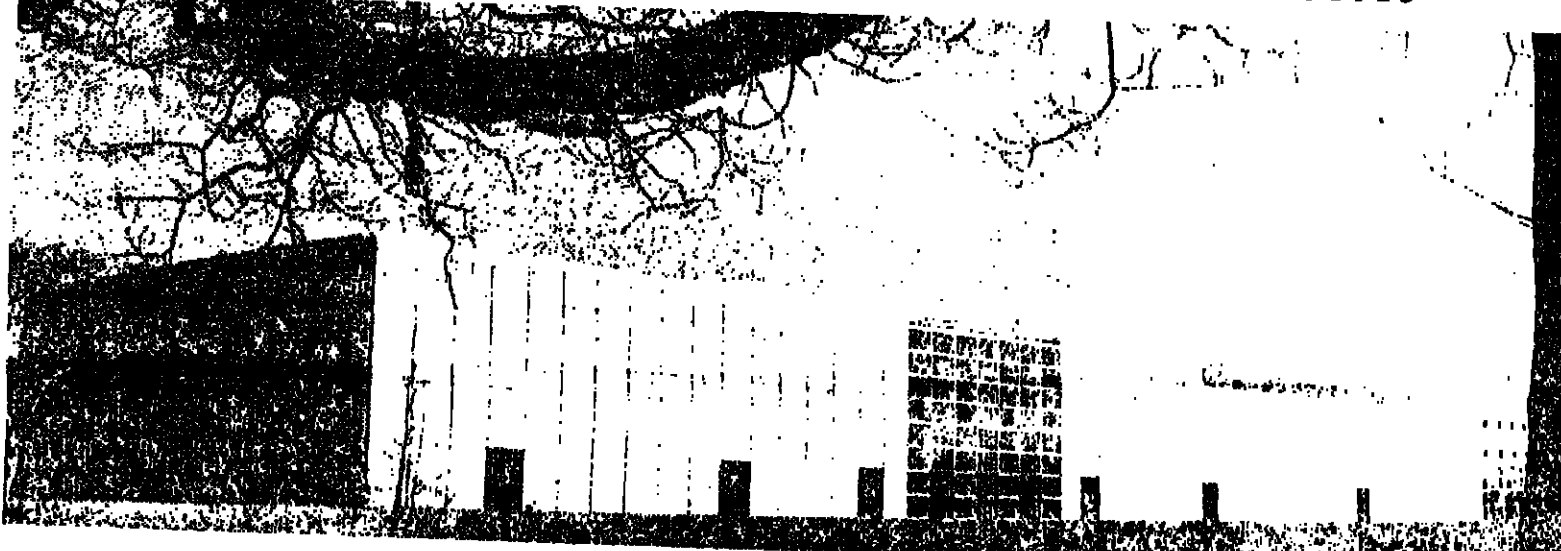
Here gold and silver objects from ancient Egypt will rub shoulders with Hebrew and western medieval illuminated manuscripts, themselves nestling against objects of Jewish ritual silver. Religious toleration, a hallmark of University College, is here nearly symbolized by the inclusion of a copy of Coverdale's translation of the Bible—the first ever in English.

The exhibitions and displays which may be seen at University College during the 10 days from 9 to 18 May constitute one of the largest exhibitions to be mounted in London in recent years. It will have perhaps 1,000 or more exhibits. But no static display can fully represent the life of an institution. This is why the college has been thrown open to the public in the middle of term, as its everyday life continues.

A. J. Turner

The author is director of the exhibition.

Sainsbury centre puts art in a natural context



Architect Norman Foster and the building he created.

The £2.5m Sainsbury Centre for Visual Arts at the University of East Anglia opened its doors to the public this month. It is, according to Dr Frank Thistlethwaite, the vice-chancellor, unique in British universities in bringing together academic, artistic and social experience.

The centre will house priceless works of art acquired over more than 40 years by Sir Robert and Lady Sainsbury. Their collection of nearly 600 paintings and sculptures contains works by Henry Moore, Francis Bacon, Picasso and Edgar Degas.

Sir Robert explained his decision to house the collection in the East Anglia University centre in a lecture given at the Courtauld Institute of Art last year. Why, he asked, not a straightforward museum or art gallery? "It is because we want to give some men and women—who better than undergraduates in a School of Fine

Arts—the opportunity of looking at works of art in the natural context of their work and daily life, not just because they have been prompted to visit a museum or art gallery—to give them the opportunity, when young of learning the pleasures of visual experience—of looking at works of art from the sensual, not only an intellectual point of view."

The glass and aluminium centre has three main areas, galleries, academic and social areas which are largely independent. In the opening exhibition the galleries will be used for the Sainsbury collection but after this only part of the collection—about a third—will be on show any one time. The exhibits will change each year so that an undergraduate will be able to see the whole collection during his time at university.

The special exhibition area will be used for a variety of special exhibitions. One of the first of these will be the University art collec-

tion which has been amassed over 10 years with money from the university council and Sir Robert. The study area acts as a link with the art history sector of the university's school of fine arts and music and is expected to be used by scholars from outside as well as inside East Anglia. The art history department will carry on its everyday academic work in the centre.

On the second floor is the senior common room and a restaurant. Members of the university will be able to use the centre six days a week.

Mr Norman Foster, the architect, said that the building's site was partly determined by the aim that it should be used by both art and science students. Many continental and American galleries were visited before the final design was done. The building was designed in line with the valley contours and the geometry of the university which was designed by Sir Denis Lawson.



The sesquicentenary exhibition is partly historical and partly contemporary. By juxtaposing past achievements with present research, we hope to be able to show not only how far the college has justified the hopes of its founders and benefactors, but also how the work it does today has grown out of its different traditions. The subjects taught in the college have been constantly modified, but its moral aim and ethical traditions remain.

University College was designed to be a training ground, with the highest academic standards, for those who would play an active part in the world. Success in achieving this aim can be measured by the response of many who have devoted to public life, the need for society at large, has also informed its permanent staff. So it is these contributions to English life that exhibition—what has the college done, and what is it doing now?

The occasion however, does not just supply an excuse for commemoration. It also provides an opportunity to open the college to the general public. So besides the central exhibition, various depart-

Two notable innovations in engineering

Engineering studies have been carried out in the college for many years, the first professor of civil engineering being appointed in 1840. In the early years of the present century two particularly notable innovations took place in the departments of electrical and mechanical engineering. In the former the first holder of the chair of electrical technology, Dr J. A. Fleming (later Sir Ambrose Fleming, FRS) is best known for his invention of the thermionic valve, patented in 1904, which created and dominated the field of electronics until the emergence of the transistor some 50 years later.

In the latter, collaboration between R. G. Coker and L. N. G. Filon (later professors of mechanical engineering and applied mathematics respectively) led to the development of the field of plasticity, a technique of experimental stress analysis based on strain-induced birefringence which is very widely used in studying the stress distributions in structures of complex shape. However, since those early times the Faculty of Engineering has continued to expand and develop in response to the needs of industry and there are now five main departments.

The department of civil and municipal engineering has wide research interests including both traditional and new areas. A long-standing interest has been in public health engineering and in recent years important contributions have been made on filtration studies which have led to new approaches to the design of water purification systems.

Due to the increasing demand for modern structures, a major emphasis has been placed on research on structural instability. The structural stability research group is internationally recognized as a centre for elastic buckling studies and pioneering work has been done on classifying the mechanics of buckling and particularly on the practically important reductions in the buckling loads due to imperfections. Recently, the fascinating relationship between elastic instability and catastrophe theory has been demonstrated.

The structural safety of concrete cooling towers has become a major interest following the department's involvement in the inquiries into the failures at both Ferrybridge and Ardara. The high sensitivity of these large concrete shells to errors in the constructed shape has been established which has led to more stringent tolerance specifications in design codes. Concrete technology research has centred on the application of non-destructive testing methods. A portable instrument for predicting concrete properties by ultrasonic pulse velocity measurements (PUNDIT) has been produced which is now manufactured commercially and is in worldwide use.

A new transport studies research group was established in 1966 with an emphasis on the application of scientific methods to transport problems. Significant contributions have been made in transport planning, control and on road safety and the group now has an established reputation as a centre for fundamental research in these areas.

The most recent research development is in marine technology following the department's participation in the Science Research Council's London Centre for Marine Structures and Materials. Research experience is now being applied to a range of problems associated with the design and construction of offshore structures such as the determination of wave and current forces, the buckling of stiffened steel cylinders and the behaviour of soil under cyclical loading.

The first chair of chemical engineering was established in 1923 as part of the memorial to William Ramsay who, as professor of chemistry in the college from 1888 to 1912, had taken an interest in industrial chemistry. The department now has a wide range of research interests with particular expertise and an international reputation in the fields of biochemical engineering, combustion chemistry, crystallization, fluidization, mixing and process control and system dynamics.

In the years since World War II the department of electrical engineering has been a pioneer in the study of very high frequency radio waves, so-called microwaves. As

Dr. S. R. Montgomery

The author is senior lecturer in mechanical engineering

Scientific research expands

A research school of physics, in the modern sense, has existed at UCL since the early years of this century. Here Sir William and Sir Lawrence Bragg, father and son, were jointly awarded the Nobel Prize in 1915 for their work on X-ray crystallography. In recent years the research activities in both experimental and theoretical physics have been expanded in the fields of high-energy physics, atomic and molecular physics, positron physics, space physics, infrared, optical and ultraviolet astronomy, astrophysics, and image processing.

Scintillation counters, Cerenkov counters, proportional chambers and drift chambers are being utilised by a group making use of facilities at CERN (Geneva) to study the interaction of very high energy elementary particles with the use of electronic detecting techniques. In space physics an experimental programme of infra-red and ultra-violet astronomy is in progress using free balloons launched in the United States as well as ground-based observations from astronomical observatories in various locations in the world.

In the field of astronomy arrangements are made for telescopic observations at the Isaac Newton telescope and at other major observatories.

Work in solar physics includes studies of the photosphere, chromosphere and corona, and of solar-terrestrial relations. Both theoretical and experimental research of atomic and molecular collisions, including positron collisions, is undertaken. A collaborative programme with the AEA Culham Laboratory for research on collisions of interest in fusion research is in progress. A cellular logic array processor has been developed and is being applied to a wide range of image processing problems.

Sir Ronald Nyholm, who was head of department from 1963 until 1971, built up a strong school in inorganic chemistry.

Theoretical chemistry is being studied in two areas, namely, the theory of excitons and phonons in molecular crystals, and the theory of molecular electrostatics. The department of organic chemistry, under the leadership of Professor J. H. Ridd, continues the long tradition of studies in

theoretical chemistry.

Professor J. H. Ridd continues the long tradition of studies in

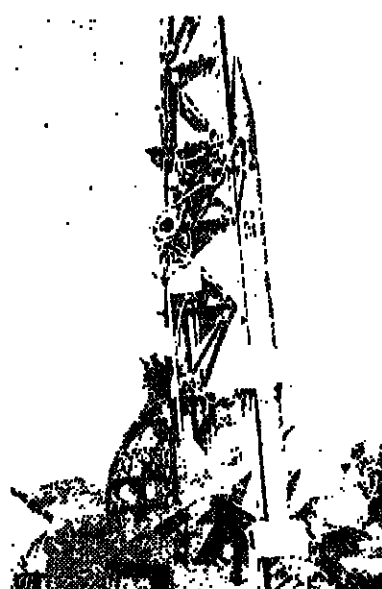
theoretical chemistry.

Professor J. H. Ridd continues the long tradition of studies in

theoretical chemistry.

Professor J. H. Ridd continues the long tradition of studies in

theoretical chemistry.



A Centaure rocket ready for firing at the Thumba range in India for an experiment developed by the physics and astronomy department.

heterolytic aromatic reaction mechanism. While Professor C. A. Vernon, who was originally an inorganic chemist, has moved into biological chemistry, and his group is studying the structure and physiological action of peptides and proteins, the mode of allergic reaction, and the mechanisms of enzyme-catalysed processes.

The "information explosion" underlies the current activities of the department of statistics and computer science. At issue is the outcome of the battle between the power of the computer to handle increasingly complex data and the ability of the human mind to interpret them.

The geological mapping of the sea floor during the last ten years has been an important aspect of the work of the geology department. Most of this work has been in the English Channel and forms the basis of official maps now being issued.

Microplateology has been a specialty of the department for many years. During the last decade extensive contributions have been made to the correlation of Mesozoic rocks by the use of microfossils, and the use of microfossils in paleogeography. Larger fossils have included a new phylogeny for the living cephalopods, taking the cuttlefish and squid back to the Jurassic (about 150 million years ago), much earlier than had been supposed.

In the biological sciences field, the department of zoology, was the first to be established as a teaching department at any university in England dating from the college

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Arts riches out of 'primordial ooze'

B. D. Greenslade

Of the 20 departments currently forming the Faculty of Arts about half can trace some kind of continuous life back to the foundation of the college in 1826. But significant intellectual origins are in the main to be found in the 1890s and the Edwardian years, when the ideal of research and consequent specialization, made the running.

From this point of view the first 70 years of the humanities at UCL are a kind of pre-history. They are rich in Victorian intellectual and cultural history, and ought themselves to be the subject of research (see the impact of Spencer, Darwin and Marx), but there is not much to be learned from that period about the reasons for modern subjects being what they are.

The last 80 years, to the present time, separate into two roughly equal periods, before and after the Second World War, phases of energetic expansion but in broad terms distinguished by diverging tendencies. In the first period the dominant trend was towards specialization, by a kind of first-parous process of growth, sub-departments and marginal interests emerging as independent disciplines.

W. Kerr Professor of English, became the first director of Scandinavian studies. Also out of English and other language studies came a vigorous department of phonetics under Daniel Jones in 1920. Spearman and Wolf in philosophy established psychology and history and method of science respectively. Anthropology, originally a branch of anatomy, achieved independence in the arts faculty under Daryll Forde in 1945.

The radical reorganization of the library led to the setting up of a School of Librarianship in 1919 with specialist experts like Hilary Jenkinson, the archivist, history, and literature, the exponent of the "scientific method" in historical research, put out branches (though, distinctively, not separate departments), in English, French and Dutch history, in Byzantine studies (through Baynes), in the history of London, and in American and Latin American history. The department of modern type research department, anticipating the tendencies of an era, had been established as early as 1892, directed for 40 years by Plinders Perrie.

These developments were reinforced, by and to some extent the cause of, the growth of specialist institutes in the university, such as the School of Oriental Studies in 1917, which took over work that had been supported by this college since the foundation, and the Institute of Historical Research in 1924, pioneered by Lubbock.

Since 1945 the college has established a department of the history of art from a chair in the Slade, and Spanish and Latin

American Studies, a notable move into interdisciplinary arrangements. The Bartlett School of Architecture and the department of town planning removed themselves from the faculty to form a new faculty of environmental studies. Linguistics, arriving as a separate discipline in the 1960s, is now associated with phonetics.

The spectrum of academic study has settled into a band of disciplines which for the foreseeable future is appropriate to the resources and scale of the college as a whole, and academic innovation has now acquired a different emphasis. The number of postgraduate students more than doubled in the period 1956-76. In undergraduate studies the freedom provided by the university in the 1960s for college-based syllabus and examination reform was exploited without hesitation.

Opportunities for students to pursue special interests within the college, and to follow interdisciplinary courses, have been enormously extended, and the examination structure has lost its old monolithic character. In some areas, for example Classics modular and course-unit arrangements offer great flexibility.

In 1949 J. Z. Young, the distinguished anatomist, believed that most of his colleagues in the college shared his faith in the "intensive study of one particular subject" as a basis for general education. For the most part this is still true of a college that stands by departmental autonomy and the single-track system, but some of the changes about in that primordial ooze known as interdisciplinary studies (and the reasons for the readiness are complex) has enriched the intellectual life of the faculty.

The college has not been extravagant in distributing chairs and titles in arts: in 1928 there were 23 professorial seats, in 1978, with three new chairs created in 1974, not far short of double, there are only 37. The names of some of those who were in office in recent years, together with a few memorable non-professional teachers, recall notable achievements in scholarship and teaching: Forde and Phyllis Kaberry (anthropology), Eric Rieu (Egyptology), Sutherland and Kerr (English), A. H. Smith (English and Scandinavian), Wedgwood and Tancock (French), Darby (geography), Elizabeth Wilkinson (German), Webster (Greek), Momi-giani and John Morris (ancient history).

It is surprising to some that the college should have done so well. The Faculty of Arts was founded in 1871 for the same purposes of investigation and experiment as were pursued by other college departments in the later 19th century.

Three other departments are concerned with art and artifacts: a four-year BA course in Classics and Greek archaeology has been devised, and amongst current research interests are Greek vase-painting and pottery. The department houses a fine collection of ancient coins, some of great rarity.

The new complex department of anthropology and geography have firm bases in science as well as arts. Anthropology, the largest department of the subject in the country, has broadly based interests in physical as well as social anthropology, including material culture. Amongst the many activities of the department, geography, which are far too numerous to do justice to, may be mentioned research in hydrology and arid lands.

The department of Hebrew and Jewish studies is one of the oldest in University College. From the beginning Hebrew was taught out as one of the classical languages, together with Greek and Latin.

Each of the modern language departments is associated with distinctive areas of scholarship. The late Professor L. A. Willoughby and Professor Elizabeth Wilkinson have an international reputation for their studies of the literature and the aesthetic philosophy of late eighteenth-century Germany, especially the work of Goethe. Many readers have been introduced to Italian humanism by the work of the late Roberto Weiss. Professor John Hale has also reached a wide public with his writings on the Florentine and Venetian Renaissance, and the Scandinavian department has many close ties with Scandinavian universities, maintained by visiting teachers.

English studies have traditionally been strong in medieval, linguistic and Shakespearean scholarship, and these are still important fields of interest in the department, which is also an important centre of place-name studies. The Survey of English Usage has been directed for many years by Professor R. Quirk.

The modern study of English Phonetics was established in this country by Daniel Jones at UCL, and this year his *English Pronouncing Dictionary* (1917), recognized as the standard for English pronunciation, has been revised in its most thoroughly revised form by Professor A. C. Gimson, head of the department of Phonetics and Linguistics.

But perhaps more productive of intellectual life than formal degree course arrangements are the opportunities, both within the faculty and outside it, for informal sharing of learning and speculation.

The author is senior lecturer in the department of English language and literature.

A pioneer in developing law studies

The law department has its origin with the founding of the college itself. Law was one of the new fields of study upon which the college was embarking and its first professors, John Austin and Maurice Anns, were lawyers of great distinction. John Austin, in particular, is one of the most celebrated names in the history of English jurisprudence.

The Ormerod Committee on Legal Education, in its report published in 1971, remarked that "it was not until the foundation of University College London in 1826 that the first modern University Law School appeared in England". Since that date the college law department has been a pioneer in the development of a modern law school and has played a key role in developing many branches of law and in encouraging similar developments in other universities in Great Britain and overseas.

In addition to developing the teaching of law in all its branches, the department of law has been responsible for creating the audience where legal research can be effectively pursued, and it may be said that this has been a vital aspect of the work of many distinguished members of its staff over a great deal of its existence.

Unlike many departments in other subjects, however, the department of law has not proceeded by way of general or collective research projects. In principle, research has proceeded on an individual basis, each particular member of staff being free to pursue his own research and scholarly interests in his own way.

This has indeed been the traditional working arrangement of every law department throughout the universities in Great Britain. It can be said, however, that the college has been a steady flow of publications, starting from the

seminal works of John Austin up to the present day.

It would be invidious in the course of this brief summary to mention particular names or particular works, but attention should perhaps be drawn to some of those fields of study to which the department of law has been making a particularly significant contribution in the years following upon the end of the Second World War.

In this respect, the subjects which deserve particular mention are jurisprudence and legal theory, public international law, air and space law, Roman law, the history of English law, the law of property, mercantile, marine and commercial law, labour law, comparative law, particularly the study of socialist legal systems, and planning and environmental law.

Lloyd of Hampstead

Professor Lord Lloyd is head of the department of law.

Going their own way on architecture research

Research in the school has flourished since the late 1920s. Before the architecture and planning were regarded as primarily practical disciplines, and the emphasis in the schools of architecture was on vocational training.

Much of the research within the school is carried out by groups or units funded by research councils or foundations. In addition and because of the practical and policy-oriented nature of the problems involved, the school has received substantial support both from government and industry. The first Urban Studies Unit, the Centre for Urban Studies, was established in the early 1950s, though it is now attached to the department of geography in the college.

During the early 1960s various other research initiatives were pursued and the majority of these are still continuing. They include the unit for architectural studies, the building economics research group, the unit unit for planning research, the development planning unit and the countryside planning unit. Other groups are centred around activities in environmental design and engineering and historical studies.

Thus there is no overall "co-ordinating" policy research, illustrated by the wide diversity of research activities which are pursued.

The range of disciplines among the research and teaching staff is also wide and includes the historians, architects, planners, sociologists of various kinds and engineers.

The school is seeking to maintain the right balance between vocational training and research. Although the financial constraints of the past few years have created problems, we look to the future with some confidence.

Peter Cowan

The author is professor of planning studies in the Bartlett School of Architecture and Planning.

Conservation course meets world-wide need for staff

The interdisciplinary MSc in conservation, which began in 1969, has contributed a large number of people to professional posts in nature conservation and countryside management, both in Britain and abroad.

From a base in the botany and microbiology department we have taught, on average, 10 postgraduate students each year selected from all over the world. Most of the successful applicants are biologists or geographers with strong biological interests, but we have had many others from such diverse backgrounds as medicine, veterinary medicine, anthropology, planning, forestry, agriculture, civil engineering and psychology; of these, usually one comes from overseas every year. About five are funded with grants from the Natural Environment Research Council, perhaps one by the British Council and one or two by charity trusts.

We aim to provide a full 12 month course in which there is a basic training in ecology, physical geography, and land-use planning, and a broad scope of applied work in rural management and conservation.

The initial training is intended to give those who have not specialised in the basic disciplines some acquaintance with concepts, problems and approaches, particularly with quantitative techniques and sampling methods. We follow this with appraisals of rural land management, agriculture, general implications, freshwater pollution and management, water supply problems, air pollution and coastal defence, given by college staff from many departments. A host of other topics are covered by visiting speakers.

In parallel with based activities we run a full programme of outside visits. These begin with an intensive three-week course in late September and October and are

informed by four three-day visits in the first two terms. These visits, which are to such organizations as the Institute of Terrestrial Ecology, the Freshwater Biological Association and the Institute of Hydrology, are intended to bring students up to date with research in the field.

In the third term, we look at a closely defined problem as an interdisciplinary team and after their formal examinations (the students spend three to four months in the field preparing their own projects). An interdisciplinary group we have tackled such topics as the ecological basis for new city planning in the Milton Keynes development, vegetation mapping with specially flown remote-sensing in the Gairloch area of Western Ross, ecological evaluation in parts of Herefordshire and the ecological effects of tourism in the Isles of Scilly. We may claim to have pioneered these last two.

Some students have continued with us for the PhD and their research topics, on the broadest general level, include the impact of human activities on the dynamics and simulation models of salt-marsh ecology, soil development and the effects of trampling on chalk grassland.

Our former students have found posts with local authorities, and in the Nature Conservancy Council, Local Naturalists' Trusts, and land-use consultancy organizations. One is an assistant director of the Countryside Commission; another was a Director of the Uganda National Parks. There are prominent foresters in Pakistan, South India and Venezuela, and several lecturers in universities and polytechnics.

Andrew Warren

Dr Warren is senior lecturer in the department of geography.

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**BOOKS
Maths communication**

Mathematics for Engineers and Applied Scientists (second edition) by S. C. Lennox and Mary Chadwick Heinemann Educational, £4.90 ISBN 0 435 71282 9

Engineering Mathematics, Volumes 1 and 2 by A. J. M. Spencer et al. Nostrand Reinhold, Volume 1, £13.00 and £5.50; Volume 2, £12.50 and £5.50 ISBN 0 442 30146 6 and 30147 2; 30206 1 and 30208 8

The first book, written for first-year students in higher education, was first published in 1970. It is based on courses at Newcastle and Durham and has been revised and extended. The other two volumes come from the department of theoretical mechanics at the University of Nottingham and are the outcome of courses given to second and third-year engineering students over a period of 16 years. Each chapter was written by one or two of the nine authors and published through discussion with two or three of the others.

There are several different attitudes towards engineering mathematics. One view is that some mathematical methods are useful for engineers but a great many are not; the engineer needs to have plenty of practice at the various useful mathematical techniques in order to be able to use them reliably when required.

Another view is that one can never be certain what mathematics will be needed by an engineer. Facility with a certain core of techniques is essential but just as important are a sound understanding of mathematics and a wide appreciation of the different applications of mathematics. To these must be added an ability to

see what mathematics is involved in a situation and to be able to learn or develop the mathematics to deal with it.

Lennox and Chadwick have written what is essentially a traditional book of methods. These are developed thoroughly with good examples and illustrations. For a first-year course the coverage is wide. Five chapters, mainly on differentiation, are followed by two on integration and others on matrices and determinants, vectors, complex numbers and variables, and differential equations. A chapter on analytical properties of algebraic equations is a prelude to two on numerical methods, two on statistics and a new chapter on applications in general.

Most concepts are introduced by definitions with examples coming later and applications last. Several introductory chapters are concerned, especially where limits are concerned. On page 4 we read "it is possible to choose a value of $f(x)$ as near as we please to the value $f(a)$ by choosing x sufficiently near to the value a ".

The italicized "choose" is misleading. "ensure" would be clearer. Differentiation of a complex function, random variation, the chi-square distribution and the idea of the solution to an ordinary differential equation were other concepts whose introductions were not clear to me. The addition and multiplication of matrices might have been a greyer meaning if they had been related to practical situations. Students would find this a good book from which to learn useful techniques but they might find it difficult to understand new concepts they met here for the first time.

The Nottingham volumes are comprehensive both in the topics covered and in the care given to

each one. Explanations are clear and encourage the kind of understanding which would form a basis for further advances. The first volume consists mainly of a set of second-year mathematics for all types of engineer.

The remainder and all of which two are concerned with the more specialized requirements of the different varieties of engineering. Its core includes ordinary differential equations with Fourier series and Laplace transforms, multiple integrals, vector functions and analysis, partial differential equations, linear algebra, both theoretical and numerical, other numerical methods including finite differences and elementary statistics.

Concepts are usually introduced from a consideration of real situations and the advantages and limitations of methods are examined. In the second volume there are chapters on linear programming, non-linear and dynamic programming, and also on statistical inference for those interested in management and production engineering and research.

A section on complex variables covers some of the needs of electricity and fluid mechanics. It seems strange to start this topic from the beginning when knowledge of it has been presumed in the first chapter of volume one. Funds chapters are concerned with integral transforms and the solution of ordinary and partial differential equations by numerical methods and more sophisticated analytical methods. Finally there is a chapter on variational methods.

The team of writers are to be congratulated on the uniformly high standard of this work. Much of a world also be of help and interest to other scientists, social and biological as well as physical.

E. D. Tapp**Current affair**

The General Theory of Alternating Current Machines

by R. Adkins and R. G. Harley
Chapman and Hall, £5.95
ISBN 0 412 15560 5

It is good to see the appearance of a paperback version of this book since it is now available at a price which all students should be able to afford. Adkins's work on electrical machines is so well known and his original book on this subject is so widely read that it can truly be said that it has contributed significantly to the teaching of undergraduates. The original book was very readable and the emphasis was physical rather than mathematical. However the matrix analysis of machines has developed rapidly of late and the original book became out-of-date. It has now been updated with the aid of a colleague.

The early part of the book sees little change. A familiarity with basic forms of electrical machine is assumed as is an understanding of electromagnetic processes. While so many books still demonstrate in tedious detail circle diagrams and phasor diagrams as a means of solving problems, it is refreshing to have a teaching text that recognizes the existence of the digital computer.

Models of a.c. machines are well covered though I would have liked to see more discussion of eigenvalue techniques. However, the discussion of practical problems is excellent combining clarity with an ability to avoid unnecessary complexity. It is the mark of a good analyst to be able to make simplifying assumptions which are reasonable so that the overall model is not unnecessarily complicated and can be readily understood.

This is one of the few books on electrical machines—and one sometimes feels that there are rather too many on this subject—which ought to be on the bookshelf of every engineer concerned with the analysis of the performance of electrical machines.

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**BOOKS
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**Hydrostatic and Hydrodynamic
Transmissions****by C. M. Edgill**

Oxford University Press, £2.50
ISBN 0 19 859154 3

These guides are the latest in a series of booklets which are intended mainly for design engineers and draughtsmen and which have a place in every technical library both in higher education as well as industry. The high standards of the previous guides are maintained in these issues.

Professor Ross's guide to metal corrosion provides an excellent introduction to the subject for the designer and should enable potential problems to be identified and appropriate action taken at the design stage. As appropriate to any design problem the guide emphasizes the need to be aware of the environment to which the product will be exposed and describes different forms of corrosion and corrosion mechanisms in a way which the designer should readily appreciate. Illustrations show how corrosion can be avoided by design changes which affect geometry and shape.

The important and often overlooked problems of cavitation, corrosion fatigue, fretting corrosion and stress corrosion are briefly identified. Material properties that are of importance in assessing the risk of corrosion are discussed in relation to environmental influences, and the corrosion resistance of different ferrous and non-ferrous metals receives attention. Except where the selection of materials is not influenced by cost it is always necessary to accept something less than total resistance to corrosion and therefore about half the guide is devoted to methods of corrosion prevention.

The guide to machinery noise is a collection of information from many sources. A knowledge of acoustics is not assumed and the information is presented in a logical sequence in such a way that the non-specialist can soon appreciate

the cause and control of noise. Formulae are not derived but simply quoted and applied. Those wishing for a deeper understanding of the subject will certainly need to use the references, but as an aid to machine designers, development engineers and, to a lesser extent, machine users for reducing the noise of their machines the guide serves a very useful purpose.

After the terms and units which apply to the subject are defined, there is an explanation of the many ways in which machines make noise. Principles of machine design for reducing noise are set out and methods of noise suppression for all important sources of noise receive attention.

Of particular interest to the development engineer is the section on instrumentation required for machinery noise measurement and analysis. Appendices include important extracts from the Code of Practice for Reducing the Exposure of Employed Persons to Noise, a section on vibration isolation, and useful illustrations of a hypothetical badly-designed noisy machine with appropriate remedies.

The purpose of the guide to hydrostatic and hydrodynamic transmissions is to provide a basic knowledge and understanding of hydraulic transmission systems and to enable the design engineer to assess whether such a system is worth considering as a possible solution to a technical problem. Any theory which is included is very basic yet sufficient to enable a few calculations to be carried out as part of a preliminary design or feasibility study and to enable the designer to discuss applications with manufacturers.

The guide covers the classification and characteristics of hydrostatic pumps and motors as well as fluid couplings and torque converters, and gives useful information on pressure, speeds, efficiencies, and costs. Problems of matching pumps and motors to engine and load are discussed, along with the requirements and selection of suitable fluids for both types of transmissions. The principles of hydro-mechanical drives are outlined, and control systems are discussed and illustrated. Examples of typical applications of the different types of transmissions are excellently illustrated which is particularly useful to the designer who is not familiar with such drives.

Alan Baker**Circuit training**

Semiconductor Circuit Design (third edition)

by J. Watson

Adam Hilger, £7.50
ISBN 0 85274 324 6

An optimist will be delighted to find that it is still possible to obtain a text in hard cover of more than 700 pages for the modest price of £7.50. Furthermore, a browse among the pages will show him that many different topics are well covered. Conversely, a pessimist will assume that the book can be little more than a minor revision of an older edition. The first few pages will confirm his view, because the opening chapters are substantially inferior to the rest. This is unfortunate, as although it is only for the first tenth of the book that a serious charge of inadequate revision can be made, it is this part which is the most conspicuous, and which forms the introduction to the subject.

In the preface, the author quotes from R. Mullineux Wahnsley: "The writer is aware that his decisions in the numerous cases that presented themselves are open to criticism, both as regards what has been retained and what has been omitted." It is surprising that, for example, the only figure showing the transfer of output characteristics should be for an obscure alloyed type and not for a current plane type. Although the hyperbolicity of the following chapter is a reader can correct his own very much inferior impression of a typical small signal transistor.

Apart from such revision faults, it is interesting that many of the other defects in the book occur in these early chapters. These are either factual (such as the puzzling representation of charge densities at a p-n junction), or a lack of sufficient explanation (there is no caution concerning the use of the Ebers-Moll model for estimating practical leakage currents).

The rest of the book is far better. The standard subjects which one would expect in such a book are well presented, and the design examples worked through are particularly useful. But what distinguishes this text from others is the coverage of a very wide range of devices and circuits. Neither the list of contents nor the publisher's abstract give an adequate idea of this range. The chapter Bipolar transistor as a Switch includes the charge of independent revision and the "Field effect transistor" includes CMOS and an introduction to CCDs. Perhaps these should be expected now, like wide diode and thyristors in "Other semiconductor devices", but the inclusion of, for example, photocells in "Semiconductor transducers" is very welcome (although many contemporary types are omitted).

The general standard of presentation, including the clarity of the diagrams, is high, and helps to make this a very readable book. It should provide very useful as an undergraduate text, especially if some guidance can be given to the student concerning the pitfalls in the opening pages. In short, it is recommended, and represents extremely good value for money.

J. G. Smith

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 by R. A. Higgins
 Houlder & Stoughton, £4.95
 ISBN 0 340 17999 0
 Structure and Properties of Engineering Materials
 by R. A. Higgins and A. R. Bunsell
 Longman, £10.95 and £7.95
 ISBN 0 582 44000 9 and 44001 7

It is only within the past two decades or so that complete courses in materials science have made their appearance, and during this period the discipline has become an extremely important subject for students of all branches of engineering. Rapid advances have been made in aerospace technology, computer development, and microelectronics, to name but a few fields in which new and complex materials have been developed and used. As a result, new introductory and comprehensive texts in the subject are needed for students in the engineering disciplines. These two books fall into this category, and both develop the subject along similar lines.

R. A. Higgins's study is perhaps the more introductory of the two, and deals for the most part with mechanical properties of materials. Clear and readable, it gives a lucid picture of the topics it covers.

The opening chapters deal with the fundamental nature of matter, giving accounts of basic atomic, molecular, and crystalline structure, and the book continues with treatments of the mechanical properties of materials in terms familiar to students of civil and mechanical engineering, and of the deformation of materials described from a molecular viewpoint.

This is followed by descriptions of shaping processes and alloying, where the diffusion laws are stated and these lead into a chapter on phase equilibrium. Here Higgins deals with the two laws of thermodynamics and neatly explains the concepts of enthalpy and entropy.

The introduction of alloys leads to a consideration of that most important of engineering materials, steel. He describes the properties and heat-treatment of carbon steels and appraises modern alloy steels and cast irons and the influence the various alloying elements have on their properties. Other materials covered include the non-ferrous metals and their alloys (in particular copper, aluminium, and titanium); the modern plastics, ceramics, and rubbers; and composite materials, including glass, reinforced plastics, and the most widely used civil engineering composites, reinforced and prestressed concrete.

Chapters on environmental effects on materials, failure, and the joining of materials precede an important chapter on the electrical and magnetic properties of materials, in which super and semi-conductivity is treated, and the book concludes with a brief introduction to nuclear science and a chapter on non-destructive testing techniques.

Harris and Bunsell's text has a similar format, but is more detailed in its treatment. They approach the subject rather more from the scientific view and are more mathematical in their description. Each chapter concludes with a comprehensive selection of problems to be worked by the reader.

They explain the atomic, molecular, and crystalline structure of matter and present a fairly detailed treatment of thermodynamics as applied to alloying and heat-treatment of steels.

The chapters on cohesion and elasticity and on strength in materials are in a much broader spectrum than in Higgins's text, and their book finishes with a treatment of environmental degradation.

Readers approaching materials science for the first time may well be advised to study Higgins's excellent introductory text first, and then deepen and expand the principles acquired by reading Harris and Bunsell. A clear and comprehensive knowledge of the basics of the subject should be obtained from both these texts.

D. J. Just

BOOKS

Perpetual motion

Intercity Transport: engineering and planning
 by Tom Hallis
 Macmillan, £12.00
 ISBN 0 333 19563 9

It has frequently been said of civil engineers that in recent years their interest in transportation has been largely confined to the design, construction and operation of highway systems. The inclusion of this book by the Rallis of the Technical University of Denmark in the recommended reading list of civil engineering students will go a long way towards countering this criticism.

Intercity Transport has been written for students in civil engineering who wish to become acquainted with such diverse aspects of transport as environmental effects, capacity and economics, not just of highways but of shipping, railways, air and pipeline transport. The author deals in his first chapter with the evolution of transport with examples ranging from the famous ancient 'silk route' leading out of China to the present day high speed Tokaido railway line in Japan. Also included, among many other examples of intercity transport systems throughout the ages, are the development of Heathrow Airport and the European railway network.

This wide ranging treatment is extended to the second section dealing with environmental factors in intercity transport. Within this section safety at sea, on the railways, on the road and in the air are covered with a comprehensive treatment of our traffic control procedures. A major environmental effect of transport is noise and considerable attention is given to the noise problems caused by aircraft operations.

In the third section dealing with capacity there is an interesting comparison between the flow of ships in

the Baltic Sea and the well-known level-of-service concept of the Highway Capacity Manual. The application of queuing theory is applied to the unloading of ships. In addition to a consideration of the capacity of rail and air transport the author gives coverage to the capacity of sea.

For students with an interest in transport economics the fourth section of the book ranges from treatment of construction costs, costs and the energy effectiveness of various transport systems, investigation of road and rail costs in Germany, France and the UK. Also in this section is a review of location theory and transport works detailing in particular approaches of Losch and a section dealing with scheduling and location.

The fifth section, 'Transport Demand and Planning', introduces the theory of growth curves, uses as examples of the technique the forecasting of traffic across Great Britain in Denmark and the investigation of the long-run behaviour of intercity passenger behaviour to a petrol shop. Other well-known transport problems which are discussed in a section are the North-East Concorde network in the United States and the Channel Tunnel. Third London Airport.

Because of its wide coverage transport in many forms has been of interest to a wide range of academic disciplines involved in planning and operation of transport. If any criticism can be levelled against the book it would be that through necessity, the treatment of individual topics is brief. For the reader requiring further detail, however, the book has a comprehensive bibliography, containing nearly 100 references to more detailed literature.

R. J. Sal

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BOOKS

Cradle of learning

Engineering in the Ancient World
 by J. G. Landels
 Chatto & Windus, £5.50
 ISBN 0 7011 2221 8

Despite the excellent work of a handful of individuals, notably R. J. Forbes, L. A. Moritz, E. W. Marsden and K. D. White, ancient technology remains—for reasons that no doubt lie largely in the background, training and career decisions of classical scholars—one of the most neglected areas of the study of antiquity. Landels's great four-volume work is now 100 years old: several of the sections of Singer's influential *History of Technology* are unreliable; neither Diez's *Antike Technik* nor Neuburger's *Die Technik des Altertums* (both dating from the 19th century) includes an adequate general survey. So Landels's book fills a definite gap and it should rapidly establish itself as essential reading in ancient history, history of science, classical civilisation and straight classical studies.

The subject poses special problems of interpretation. The gaps in the archaeological record can sometimes be supplemented from the literary sources—and vice versa—though often the two main types of evidence present rather different, even conflicting, pictures. The nature of the lacunae in the written testimony itself carries some important lessons.

Landels several times emphasises that—whatever we may wish to say about the more literary authors such as Vitruvius, the technical writers sometimes omit information on points of detail not out of any disdain for particularities, but because they assume they are too well known to need description. One might add that some ancient authors on the crafts (although not so much in engineering as in other fields) appear deliberately to withhold information, or to veil their meaning, their writings being designed to provide incomplete accounts that have to be supplemented by oral instruction.

When the only reliable way of resolving problems connected with the form and function of ancient mechanical devices is to construct working models, though this may in some cases be obvious, but in the past or obscurely of the ancient evidence, but also in the difficulty of obtaining materials that correspond precisely to those the ancients used or of making adjustments for those that do not. The scale of the great acropolis of Maradeia, a well-known catapult was his practical experimentation with full-scale models. Landels, who has designed and carried out some interesting collaborative projects with his engineering colleagues at Reading, continues and extends these studies, and through the book he uses his own provisional practical calculations.

Harnessing the elements

Sun Power: An introduction to the applications of solar energy
 by J. C. McVeigh
 Pergamon, £7.00 and £3.50
 ISBN 0 08 020862 2 and 020863 7

Although the number of journals, technical articles and reports on applications in solar energy continues to grow apace in response to the increasing interest in the subject, there still remains a dearth of literature giving a sound, overall perspective on the practical use of solar power.

McVeigh's book acts as an invaluable source of reference drawing together much of the disparate material into clearly illustrated sections dealing with solar heating, solar thermal power and other thermal applications. In addition, he includes, briefer and more superficial sections on methods of solar analysis, the use of solar cells, photovoltaics, photobiology and wind power. Covering a wide range of practical engineering applications, it is perhaps the most important in the book and would well have acted as its basic theme.

In spite of its strength as an

abstract of useful data, it is much less successful in providing an introductory perspective on the subject. As the book is primarily intended to help and encourage those interested in solar energy applications, such a perspective is important. While it is reasonable to reduce the theoretical content to a minimum by directing the reader to appropriate literature, it is clearly desirable to explain the overall principles of the various systems and the role of the components within them. For example, in heating systems, very little attention is given to the importance of thermal storage, insulation, heat exchangers, circulation equipment and central devices in determining the system's efficiency and in minimizing heat losses and the use of supplementary primary energy sources.

However, these criticisms are perhaps a reflection of the 'state of the art' at the time of writing the book. In the past year the significance of these aspects have become more apparent. It is to be hoped that the author will be given the opportunity to revise his text in line with knowledge as it becomes available.

Ray Maw

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Colin de la Housse Corcoran
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Applicants should have an honours degree in English Language and Literature, and a postgraduate qualification in TEFL and/or Applied Linguistics, and some experience of teaching English as a second language. The successful candidate will be expected to teach English to students of Science and Technology, and to supervise their work. The salary scale is £5,524-£6,611-Bar-£6,632-£7,927 p.a.

Further particulars and application forms may be obtained from the undersigned.

THE QUEEN'S COLLEGE, GLASGOW

The Governors invite applications for the post of:

VICE-PRINCIPAL

Salary £9,381 (under review), including the appropriate supplement within the Pay Policy.

Effective date of appointment, 1st September, 1978. Application forms and further details may be obtained from the Principal, 1 Park Drive, Glasgow, G3 6LP.

The closing date for applications is 19th May, 1978.

UNIVERSITY OF MALAWI
CHANCELLOR COLLEGE

Applications are invited for the post of:

LECTURER IN ENGLISH

Applicants must have a good first degree and postgraduate training in English. The appointment will be for a full-time post and the successful candidate will be expected to teach a range of courses which will include drama and remedial English. A particular interest in African and practical drama is looked for since the post is located in the Department of English. A particular interest in African and practical drama is looked for since the post is located in the Department of English.

Salary: Lecturer II - £4,146-£6,387 (under review), including London Allowance and pay supplement.

Application forms to be returned by 8th May, 1978.

UNIVERSITY OF LONDON

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APPOINTMENT OF
CAREERS ADVISER

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The duties of the post involve giving sound careers advice to students and graduates of the University and assisting them to obtain employment. Initial salary will be in accordance with age and experience within the Grade II of the National Salary Structure for University Administrative Officers, currently £5,954-£7,308 per annum plus £450 London Allowance with membership of the Universities Superannuation Scheme.

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UNIVERSITY OF
GEZIRA—SUDAN

Applications are invited for the post of ASSOCIATE PROFESSOR/LECTURER in ENGLISH LANGUAGE (SCIENTIFIC ENGLISH) in the FACULTY OF SCIENCE AND TECHNOLOGY.

Applicants should have an honours degree in English Language and Literature, and a postgraduate qualification in TEFL and/or Applied Linguistics, and some experience of teaching English as a second language. The successful candidate will be expected to teach English to students of Science and Technology, and to supervise their work. The salary scale is £5,524-£6,611-Bar-£6,632-£7,927 p.a.

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THE TIMES HIGHER EDUCATION SUPPLEMENT 28.4.78

Universities continued

BRADFORD

THE UNIVERSITY
SCHOOL OF CIVIL AND
STRUCTURAL ENGINEERING

Applications are invited for the post of ASSISTANT PROFESSOR/LECTURER in the School of Civil and Structural Engineering. The successful candidate will be expected to teach and supervise the work of students in the field of Civil and Structural Engineering.

Further particulars and application forms may be obtained from the undersigned.

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EXETER

THE UNIVERSITY
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LONDON

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Further particulars and application forms may be obtained from the undersigned.

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THE QUEEN'S COLLEGE, GLASGOW

The Governors invite applications for the post of:</

Colleges of Further Education

LONDON BOROUGH OF BRENT
WILLESDEN COLLEGE OF TECHNOLOGY

**HEAD OF DEPARTMENT
OF PROFESSIONAL
BUILDING STUDIES
(GRADE VI)**

Applicants are invited for the above-mentioned post which will not be available from September 1, 1978. The College is a major centre for tertiary level education having a considerable involvement with courses related to building and civil engineering, each being the responsibility of two departments, those of Architectural and Building Engineering and Civil Engineering. The responsibility of the post is to ensure that the continuity arises due to the present holder having been appointed to a Vice-Principalship in the College.

Candidates should be suitably qualified, well experienced and have the knowledge and understanding of students preparing for the qualifying examinations leading to corporate membership of the several professional bodies associated with building and surveying, and of the various aspects of building and civil engineering in one or more of the fields associated with building or civil engineering. The work of the Department includes full time sandwich and part-time courses leading to various qualifications, Higher National Diplomas, Diploma awards, HNC in both Building and Civil Engineering (proposed to be transferred to TEC Programmes from September, 1978), and Certificate Programmes.

The Department of Professional Building Studies is Burnham Grade VI and the present salary for the post is in the range of £8,951 to £9,495 (including London Allowance payment, and 1976 and 1977 supplements).

Application forms and further particulars (stamped addressed envelope) may be obtained from: The Chief Administrative Officer, Willesden College of Technology, Dondri Road, London NW10 2XD. Telephone 01-450 8147—to whom the completed forms should be returned within two weeks of the appearance of this advertisement.

Autoscan® assistance available in appropriate cases.

100

METROPOLITAN BOROUGH OF STOCKPORT
STOCKPORT COLLEGE OF TECHNOLOGY
Department of Management and

Applications are invited from suitably qualified persons for the following full-time post, duties to commence September 1, 1978, or as soon as possible thereafter:—

Senior Lecturer in International

Marketing and Distribution

to have a major role in a team engaged in teaching to final professional level. Experience in overseas and home marketing is essential, preferably including client contact.

The successful candidate will be involved in further developing the work in this field, liaison with industry, professional bodies, etc, and in arranging short courses and seminars.

Reconsideration: previous applicants will be considered.

Salary scale: Senior Lecturer: £5,523 to £6,447 pa (subject to review in the light of 1978 pay award).

Application forms and further particulars from the Principal, Room 6/122, Stockport College of Technology, Wallington Road South, Stockport SK1 3UG, on receipt of stamped self-addressed envelope, quoting reference 519. Closing date for applications

Courses

**COUNTY OF
SOUTH GLAMORGAN**
SOUTH GLAMORGAN INSTITUTE OF

**SOCIETY FOR THE PROMOTION OF
HIGHER EDUCATION**

FACULTY OF SCIENCE

Qualified teachers are invited to apply for a

RETRAINING COURSE

In the shortage subject of

MATHEMATICS

A one-year full-time course to retrain teachers in teaching Mathematics, Mathematics and applied sciences and leading to a Supplementary Certificate of the University of Wales is offered by the Department of Physical Sciences and Mathematics.

Applications are invited from serving teachers and teachers who are not at present in employment for entry to the course in September, 1978.

Further details and application forms from: Head of Mathematics (Education) Section, Department of Physical Science and Mathematics, South Glamorgan Institute of Higher Education, Cardiff Road, Cardiff, CF11 3TA.

6XD.

Gosta Green, Birmingham B4 7ET
DEPARTMENT OF
EDUCATIONAL ENQUIRY
Head of Department:
Professor Richard C. Whitfield
SSRC
STUDENTSHIPS
OCTOBER 1978

Applications are invited from persons who will by September have graduated with at least upper second-class honours in the social sciences or education for studentships on programmes leading to higher degrees in the Department. Successful applicants will either pursue doctoral research or be enrolled on the one-year full-time MSc Course in Educational Studies. In 1978 the research priorities are in the areas of television viewing and school performance, secondary data analysis, studies of interactive teacher decision-making, and readings and policies for "Preparation for Parenthood" though other topics may be considered. Further information about the Department and forms of application are available from Miss Lynne Harris, Secretary to the Head of Department, telephone: 021-559 3611, extension 534.

THE UNIVERSITY
OF AUSTON
IN BIRMINGHAM

General Vacancies

ilea INNER LONDON
EDUCATION AUTHORITY

Inspector of Science (Schools)

Salary scale: £7,868.80 - £8,669.80 (inclusive of London Weighting and Phases 1 and 2 Supplements).

Required for September 1978 an Inspector of Science (Schools). Applicants must have a good academic background in Chemistry, together with some years' teaching experience in secondary schools. The successful candidate will take part in the general staff of the Science Inspectorate, with particular responsibility for the schools in certain of the divisions of the I.E.A. In addition he/she will be required to give advice on chemical matters to the whole Authority.

Details and application forms from the Education Officer (EO/Est/2A/1), Room 307, County Hall, London SE1 7PB. Please enclose a stamped addressed foolscap envelope. Forms to be returned by 12 May 1978.

AMGUEDDFA GENEDLAETHOL CYMRU NATIONAL MUSEUM OF WALES KEEPER OF ZOOLOGY

Applications are invited for the Keepership of the Department of Zoology, which will become vacant on 1 July 1978. Contributory Pension rights. Salary scale: (under review) £7,580 per annum to £9,275 per annum (+ appropriate cost of living supplements).

Further particulars of the post may be obtained from The Secretary, National Museum of Wales, Cardiff CF1 3NP. Applications (three copies) should be submitted not later than WEDNESDAY, 24 MAY, 1978.

WILTSHIRE EDUCATION COMMITTEE Urchfont Adult Education Residential College

APPOINTMENT OF WARDEN

Salary: £7,032 p.a. (pay award pending). Applications are invited from persons with wide experience of adult education and an interest in the development for the post which falls vacant on 1st November 1978, due to the retirement of the present holder. A house is provided; assistance with removal expenses available in appropriate cases.

Further particulars and application forms (S.A.E. please) from: The Chief Education Officer, County Hall, Trowbridge, Wiltshire, date 15th May, 1978.

Overseas

OVERSEAS TEACHING POSTS

INSPECTORS OF ENGLISH (PRIMARY) (CAMEROON)

Educational Delegations for the Littoral and Centre-South Provinces—Douala and Yaounde 2 members of a team concerned with the introduction of English in Francophone Primary Schools.

Duties: To inspect classes, advise teachers and organise in-service courses.

Qualifications: Degree (preferably in English or Modern Languages), 1 year university diploma in TEFL relevant experience, preferably including teacher training, fluent French.

Salary: £4,589-£5,618 p.a. plus 10 per cent inducement allowance.

Benefits: Personal and children's allowances; free furnished accommodation; 2 years Kelt contract. 78 RE 33

LECTURER IN ENGLISH (CAMEROON)

University of Yaounde.

Duties: Lecturing in English Language with possible involvement in teacher training. To lecture for and supervise the Postgraduate Diploma in English Studies. Qualifications: Degree in English (or Modern Languages), Postgraduate qualification in English Language, preferably Ph.D., plus relevant experience and fluent French.

Salary: £5,210-£7,054 p.a. plus 10 per cent inducement allowance.

Benefits: Personal and children's allowances; free furnished accommodation; 2 years Kelt contract. 78 BU 46

TEACHER TRAINING EXPERT (CAMEROON)

A member of a team based in Yaounde concerned with the introduction of English in Francophone Primary Schools. To decide the outline, programmes and teaching methods in training new teachers of English in French Primary Schools; to direct the teaching and assist with in-service training. Salary: £4,589-£5,618 p.a. plus 10 per cent inducement allowance.

Qualifications: Degree, TEFL qualification and experience, fluent French.

Benefits: Personal and children's allowances; free furnished accommodation; 2 years Kelt contract. 78 RE 4

LECTURER IN ENGLISH (CAMEROON)

Ecole Normale Supérieure, Yaounde.

Duties: Teaching English and Methods of TEFL; supervision of teaching practice; participation in setting and grading examinations.

Qualifications: Degree, teaching qualification (including a significant TEFL/TESL component or a general teaching qualification in TEFL/TESL or Applied Linguistics) and 2 years experience in a relevant overseas country.

Salary: £4,589-£5,618 p.a. plus 10 per cent inducement allowance.

Benefits: Personal and children's allowances; free furnished accommodation; 2 years Kelt contract. 78 TT 2

THE BRITISH COUNCIL

LECTOR IN ENGLISH LANGUAGE (YUGOSLAVIA)

University of Ljubljana

Duties: To teach English Language to university students of English, Degree and some experience in TEFL at tertiary level essential. TEFL qualification (minimum RSA or PGCE with TEFL element) desirable. Salary: A local salary of between 5,000 and 6,000 New Dinars per month (present rate of exchange £/ND 31.42). This salary is non-convertible. In addition, an annual subsidy of £1,244 is paid into the lecturer's UK bank account by the British Council.

Benefits: Free medical service; employer's portion of superannuation, if applicable; 1 year Minor Benefit contract, renewable. 78 UU 47

ESP COURSE DESIGNER AND ESP TEACHER TRAINER (BANGLADESH)

Institute of Modern Languages, University of Dhaka, Dhaka, postgraduate TEFL qualification and overseas teaching experience.

Salary: £4,589-£5,618 p.a. plus 10 per cent inducement allowance.

Benefits: Overseas and children's allowances; free furnished accommodation; 2 years Kelt contract (both parts). 78 PU 42-43

ADVISER IN ENGLISH FOR SPECIAL PURPOSES (NEPAL)

Curriculum Development Centre, Tribhuvan University, Kathmandu.

Duties: To produce a common core textbook for University Certificate students. To prepare ESP materials for institutes within the university, e.g. Engineering, Medicine, Business Administration and Law. Qualifications: A good honours degree, a one-year postgraduate TEFL qualification and substantial experience of ELT and materials production, preferably in a developing country. UK citizens aged 35-45 preferred.

Salary: £5,210-£7,054 plus 10 per cent inducement allowance.

Benefits: Personal and children's allowances; free furnished accommodation; 2 years Kelt contract, renewable. 78 PU 44

LECTURER IN ENGLISH (SOUTH AFRICA)

University of Fort Hare, Alice. Lecturer to run practical English course for Xhosa speaking students. Degree in English and experience of teaching tertiary level English essential. One year university qualification in TEFL/TESL desirable. Single candidates only.

Salary: £4,490-£6,514 p.a. approx.

Benefits: Free furnished accommodation; employer's portion of UK superannuation; 3 year contract. 77 HU 62

Return fares are paid. Local contracts are guaranteed by the British Council. Please write briefly stating qualifications and length of appropriate experience, quoting relevant reference number and title of post, for further details and application form to The British Council (Appointments), 65 Davies Street, London W1Y 2AA.

General Vacancies continued

PERSONNEL OFFICER

TEACHING AND RESEARCH (PLANNING AND DEVELOPMENT)

(PO1 (6-10) £5,406-£6,057 p.a.
plus supplements of £312 and £208 p.a.)

We wish to recruit to the Planning and Development Team in the Central Personnel Department, a Personnel Officer, with at least two years experience after qualification. A strong interest in the nature of occupational development through change in structure and attitudes, however initiated, is essential, and practical experience in consultancy approaches to problem solving is desirable.

This appointment will include a proportion of time to be devoted to lecturing and/or research in personnel management subjects with Newcastle upon Tyne Polytechnic, with whom informal relationships exist in respect of "work" and "training".

Application forms, returnable by 12th May, 1978, are available from the Principal Personnel Officer, Civic Centre, Newcastle upon Tyne NE1 8QJ.

City of
Newcastle
upon Tyne



WORLD UNIVERSITY SERVICE

Applications are invited for the following posts:

Deputy General Secretary (Programmes)

The person appointed will have responsibility for Leadership, International programmes, UK Schooling programme, and Project development.

Candidates should have substantial regional, international experience, have a good understanding of the World Development Bank, and be sympathetic to the service's aims. Salaries are under review and will be set at the discretion of the committee.

Programme Officer (Africa)

This is a part-time post involving administration, organisation and planning of African Schooling programme, in and out of the UK. The person appointed will have a good understanding of the service's aims and objectives, and be sympathetic to the service's aims.

Candidates should have a good understanding of the service's aims and objectives, and be sympathetic to the service's aims. Salaries are under review and will be set at the discretion of the committee.

Project Officer (Campus Scholarships)

This post has been established to promote, develop and administer the Campus Scholarship scheme, which provides financial support for students from developing countries to study in the UK.

Candidates should have a good understanding of the service's aims and objectives, and be sympathetic to the service's aims. Salaries are under review and will be set at the discretion of the committee.

Overseas continued

WESTERN AUSTRALIAN SECONDARY TEACHERS COLLEGE

MATHEMATICS LECTURER

Applications, closing on 31 May, 1978, are called for the above position.

Appointment will be from January, 1979.

QUALIFICATIONS:

Applicants must be well qualified academically with experience in tertiary and/or secondary education.

CONDITIONS OF SERVICE:

Similar to those applying in Australian Colleges of Advanced Education.

SALARY:

Placement within the following range to be negotiated on appointment: £9,307 to £12,226 based on rate of £1-SA1.61.

Application forms and detailed statements regarding duties and qualifications and conditions of service, can be obtained from the Migration Liaison Officer, Western Australia House, 115 Strand, London, WC2R 0AJ. Tel: 01-240 2881.

NUFFIELD PROVINCIAL HOSPITALS TRUST

ASSISTANT SECRETARY

The Trust wishes to appoint an Assistant Secretary, preferably a graduate or professionally qualified, with a good knowledge of health affairs.

Salary by arrangement.
Applications, marked "Personal" by
May 12th to:
Gordon McLachlan,
3 Prince Albert Road, London NW1 7SP

WARRNAMBOOL INSTITUTE OF ADVANCED EDUCATION

Lecturer in Curriculum Language

WIAEC is a regional college of advanced education in a city of 20,000 people. It is situated on the South-West coast approximately 250 miles from Melbourne.

The Institute includes a small but dynamic Faculty of Teacher Education. This faculty prepares teachers to work in primary schools. The courses of study and experience emphasize an informed, pragmatic approach to teacher training.

DUTIES:

The person appointed will have had a broad background in the teaching of English in the primary school. The appointment will involve work in the Faculty of Teacher Education and will be expected to take part in both the Institute and school-based components of the course.

QUALIFICATIONS:

The person appointed will have had a broad background in the teaching of English in the primary school. It is highly desirable that the person holds a postgraduate qualification in a relevant area.

SALARY:

As per Victorian public sector scale according to qualifications and experience.

APPOINTMENT:

From 1st July 1978.

Written applications stating qualifications, experience and giving sufficient information to enable suitability to be assessed, together with the names and addresses of three referees should be addressed to the Principal Lecturer, WIAEC, 115 Strand, London, WC2R 0AJ. Further information may be obtained from Mr. R. Jones, Head of Teacher Education. Applications close May 10, 1978.

AUSTRIA

Post 2101/10

On 10th July 1978

Dear Sir,

I am pleased to inform you that your application for the post of Lecturer in English Language at the University of Salzburg has been successful.

You are invited to accept the post of Lecturer in English Language at the University of Salzburg, Austria, working with the English Language Centre, Salzburg.

The post is a part-time position, involving administration, organisation and planning of the English Language Centre, Salzburg.

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